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September 1913
Volume II Number I

History of Libraries Charles A. Coolidge
The Planning of Libraries Herbert Putnam

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THE ARCHITECTURAL QUARTERLY
OF HARVARD UNIVERSITY

VOLUME II SEPTEMBER MDCCCCXIII NUMBER I

HISTORY OF LIBRARIES

WITH NOTES ON THE REQUIREMENTS OF MODERN LIBRARIES

THE SUBSTANCE OF A LECTURE DELIVERED BEFORE THE SCHOOL OF ARCHITECTURE

BY DR. CHARLES A. COOLIDGE
ARCHITECT

THE word library has two meanings, — a collection of books, and a place where books are kept. Collections of books must have been established almost as soon as letters were invented, but the most ancient known was founded by Osymandyas,* king of Thebes. It had the motto, "Here is medicine for the mind." The distinction of having founded the first library of which any remains exist belongs to Assurbanipal, king of Nineveh, in the seventh century B.C., who, instead of following the custom of his predecessors and recording his deeds only on his palace walls, had them written on tablets of clay as you may read in his own words, "In my respect for Nabu, the God of Intelligence, I have collected these tablets — had them written, signed with my name and placed in my palace." This library occupied two rooms, each not over thirty feet in extreme dimension and contained thousands of clay tablets — numbered, arranged, and catalogued according to the subjects treated, and forming a complete record of Assyrian knowledge and civilization as well as the archives of the kingdom.

Many other important libraries existed in ancient times, of which no trace may be found, and among these should be mentioned the library of Pisistratus at Athens, notable for its antiquity. The famous libraries of Alexandria, founded in the third century B.C. — the Bruchium and Serapeum, both very large and rich — were the most important in the ancient world. The Serapeum was said to contain 700,000 volumes, but all were completely lost when the library was burned by the Saracens in A.D. 640.

At Pergamum, in Asia Minor, there was a library which Antony in later times gave to Cleopatra and which existed until the fourth century of our era. It was founded by Eumenes II in connection with the group of buildings of which the "Great Altar" is the best known. The library consisted of two large rooms opening from the portico on one side of an

* Identified with Rameses I.

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open court — the portico being an important adjunct of the early libraries. This arrangement is interesting as it was evidently the prototype of the libraries which became so numerous under the Roman Empire.

The growth of libraries under the Roman Empire was at first slow; but once started, its development was much extended, and collections of books became common, and appropriate buildings for them usual. The Romans displayed in their libraries their characteristic fondness for culture and art on a grand scale, and revealed withal an appreciation for books — "modest companions which please without giving trouble." Martial in describing them surrounds them with an harmonious setting, which should create an atmosphere both agreeable and stimulating for their use — making the place sacred to the muses, and knowledge more grand and beautiful by statues, busts, and pictures. The wit and learning of Rome assembled in these places or under the porticoes of temple or forum which adjoined them.

It was the ambition of Julius Caesar to found the first great libraries for Latin and Greek literature — the Romans held all others in contempt — but death interfered with the execution of his design, and the work was carried out by Pollio soon after. Augustus built a splendid temple to Apollo on the Palatine hill and added a portico and library; there was one within the enclosure called the Portico of Octavia, two in the Forum of Trajan; libraries were also built by Tiberius, Vespasian and others, until the number reached twenty-eight under Constantine. These libraries were public; books might be withdrawn, but the use was, of course, limited practically to the scholars and literary men, the cultured persons of the day. There were also many libraries outside of Rome — municipal libraries — often patterned after those in the capital city.

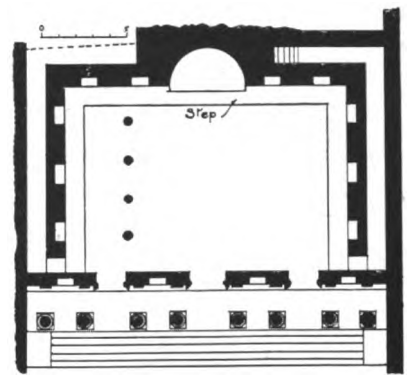
Before the time of these public collections of volumes, the book shops which opened in the early empire stood in the place of libraries, except for such private collections as might exist. The shops are interesting also from the fact that they were the publishing houses of the day where books were copied and made, which were for the most part rolls of papyrus or parchment mounted on rods, although the modern form bound in wood was also used. They were often very elegant, and Ovid in his introduction to Tristia gives the characteristics of the de luxe edition of the time: a purple case, parchment anointed with oil of cedar, rods painted, with ivory knobs, title in scarlet, and edges polished with pumice.

These books or rolls were stored in a box, or in presses with shelves and pigeon holes; the presses being set against a wall or in a recess or in the centre of the room. The library rooms would have many of these presses containing the more important volumes, while the rest of the collection would be stored in smaller rooms near at hand. On the case of each press might be found a catalogue of the books within.

The library at Ephesus is typical of the Roman arrangement. Entrance is by a portico through large doorways to the main room, which is

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monumental in scale. On the front wall behind the columns are bas-reliefs of allegorical subjects. Within, opposite the entrance was a niche for a statue; other statues adorned the place, while on the doors of the presses or above them were bas-reliefs or busts, or medallions of poets and writers: "immortales animae in locis iisdem loquantur." The reader must have had movable seats or else used the step which is shown along the wall.



LIBRARY AT EPHESUS

The smaller library might have continuous cases to the height of a man — while above would be medallions with portraits and names of writers, and a table or press in the centre of the room.

The functions of the library were to serve (*a*) as a meeting place (*b*) as a place for reading and reference. It comprised two main divisions. A reading room and a store room — the attendants were public or enfranchised slaves. The Vatican Library is the nearest approach to the old Roman Library.

Private libraries excelled the public libraries in magnificence. Colonnades and reading rooms with rich pavements, cases of cedar inlaid with arbor vitae and chiselled in ivory and silver marked the taste of the rich Roman, in city house or country villa. The elegance became so extreme as to call forth the protest that the best architects do not wish to construct libraries with gold ceilings or with pavements of other marble than Cipollino — because the glare of gold is hurtful to the eyes while the green of Cipollino is very restful. The final touch in the elegance of a private library is mentioned in a letter from Cicero to Varro. "If you have in the library a garden, you will lack for nothing" (probably a portable garden in vases of terra cotta is referred to). We must regret that so little of this splendor is preserved. Italy was overrun by the Huns, Vandals, and Goths — practically all was destroyed, and such books as were saved were kept in the religious houses, the monasteries, founded by men of the new religion then fast growing. Amidst the gloom of this barbarian invasion, the places where these books existed were "like mountain peaks tipped with gold by the rising sun when all below remains dark." To this period we now devote our attention.

As the Roman library began near the temple, so the Christian library began near the Church — the volumes being considered the same as vestments and kept in one of the three apses of the church — the vestments being on the right, the books on the left.

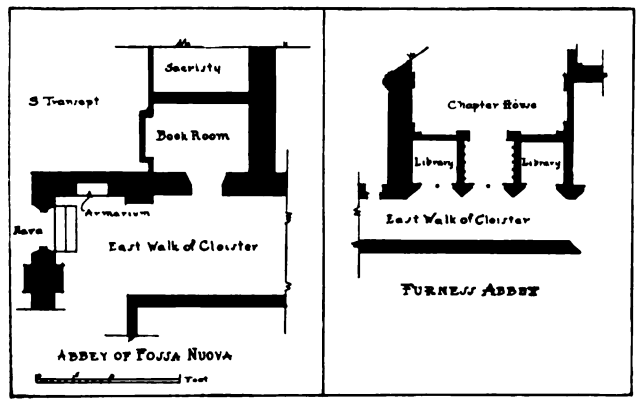
With the development of the monastic orders the library became an important adjunct — it was the public library of the time, and contained (*a*) books for lending and distribution to the brethren, (*b*) books of reference and (*c*) books for loan to persons in general on security. These

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libraries were often endowed and their significance may be gathered from the following dictum, " claustrum sine armario castrum sine armentario."

In the arrangement of these monastic houses the cloister was a most important feature. Here the work was done, books were made and kept and studied.

The problem of caring for books in the early Middes Ages was a very simple one. The books or manuscripts saved from the general ruin were few and could easily be placed in a chest, or enclosed in a cupboard placed by itself or in a recess in the wall, — often between the chapter house and the door into the church at the east side of the cloister. Then as the number of volumes increased a small store room was made between the transept and chapter house or at the west end of the chapter house.



MONASTIC LIBRARIES
FOSSANOVA, ITALY — FURNESS ABBEY, ENGLAND

The next development in the mediaeval library was to enclose the cloister at the ends, glaze the openings, and construct carrels of wood, near the windows where the brothers might study with a certain seclusion — the book presses being set against the wall. These carrels have entirely disappeared, but they resembled sentry boxes, with a seat and desk and had open wood doors of no great weight — (The stone carrels at Gloucester suggest the result of such a treatment.)

As books became still more numerous they were scattered about in special rooms in various places — loan books in one room — reference books in another — until a suitable structure was provided to house them which was usually built over some existing building or cloister. This single room later developed into a separate building.

The Cathedral libraries were mostly built in the 15th Century, and were similar to the monastic libraries.

It is interesting to note the care and attention devoted to the books, and the liberal provision for their use. A curious foundation at Worcester illustrates this point very well. A library was established and endowed, with provision for a keeper with a lodge or chantry. The library was to be open every week day, two hours before nones, and two hours after — the keeper was to explain difficult places in the books — to lecture once in the week and to preach in the cathedral on Holy Thursday.

The College libraries, like the Cathedral libraries, were derived from monastic customs and practice.

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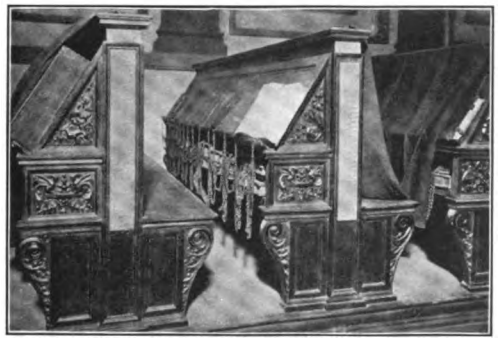
Books, the most precious treasure of Scholars, were regarded in the same light as charters, muniments and valuables. They were loaned for text books under acknowledgment and kept in chests in a secure place and audited annually. Other books used for reference were chained in the library chamber. These libraries were built at the same time as the monastic libraries, and doubtless had the same fittings due largely to the influence of student monks and to the monastic education.



LIBRARY OF MERTON COLLEGE, OXFORD

With the growth of the college library, there came a new arrangement, the lectern system, an arrangement of reading-desks spaced at regular intervals with benches between, in the early buildings. There are no remains of this system as used in the English libraries, but the library of the church at Zutphen, Holland, exists as originally built and shows this system very well. A book shelf underneath the desk was added later. The 15th Century library was thus a long narrow room with a row of equidistant windows and lecterns of wood on which books were laid and chained.

In Italy the famous Vatican Library was built by Pope Sixtus IV, (1471–75). There were four rooms for the Greek, Latin, Reserved, and Pontifical libraries. The rooms were carried out in a most perfect manner and decorated by Greek artists. The books were left on lecterns and in presses and chests. The Medicean library at Florence, designed by Michelangelo, presents a modified lectern system ; for convenience and decoration, it stands alone among libraries.



THE MEDICEAN LIBRARY, FLORENCE

What may be called the stall case system resulted from the lectern system by adding book shelves above the desk which was sometimes made movable.

All mediaeval libraries were practically public. Beauty was no less an object than utility, and globes, maps, and astronomical fittings formed part of the furniture. Sometimes a museum was added.

With the Reformation and the suppression of the monastic orders the whole system was swept away, and when libraries began to be built again, the introduction of printing had made new conditions. The first library to be so constructed was that of St. Johns College, Cambridge,

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1623–28, where there was no chaining and no desk or seat. Chaining, however, was not finally abandoned until the end of the 18th Century.

Wall cases were the final stage, first exemplified at the Escorial (1584) later in the Ambrosian Library at Milan, which had a gallery and books



LIBRARY OF THE ESCORIAL

to the ceiling. Only the pope could absolve those who stole books here or touched one with soiled hands. The libraries now constructed either had wall cases, or wall cases and alcoves, and this arrangement continued until almost our own time.

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The essentials to all modern American libraries are a shipping room where the books are received and unpacked, a cataloguing room, where they go to be catalogued, a space for the storage of books after they are catalogued (the method employed varies according to the size of the library and its uses), a delivery room which may or may not, according to its size, contain the card catalogue of the books in the library, a reading room, and a librarian's room. These are common to every library except the very smallest in which all these functions may be subserved in one room. The only libraries which vary in requirements from the above are the branch libraries where the books are sent in boxes from the main library where they are permanently stored.

Mr. Soule in his recent book subdivides libraries as follows: —

Small Library Buildings, Moderate and Medium Libraries, Very Large Buildings ; and into classes as follows: Private and Club, Proprietary, Institutional, Professional (Medical, Theological, Special and Business, Law, Scientific). Government and Historical (National, State, Historical, Antiquarian). Educational (School, College, University). Public (Central, Branch, Suburban).

Moderate and Medium Libraries

Moderate and Medium Libraries to cost from twenty thousand to a million dollars: —

As a library grows the rudimentary divisions still prevail, added to according to special needs, such as

Separation of books, as under Art, Music, Patents, etc.

Separation of work, as Librarians, Cataloguers, Delivery, Janitor.

Separation of readers, as Adults, Children, Serious and Light Reading.

Proprietary

Library Clubs owned in shares and supported by dues like the Athenaeum in Boston: —

Members generally have a higher literary taste than in social clubs, and the alcove and window nook might be properly used to advantage, which would allow the reader to be comparatively undisturbed by either the attendants or other readers.

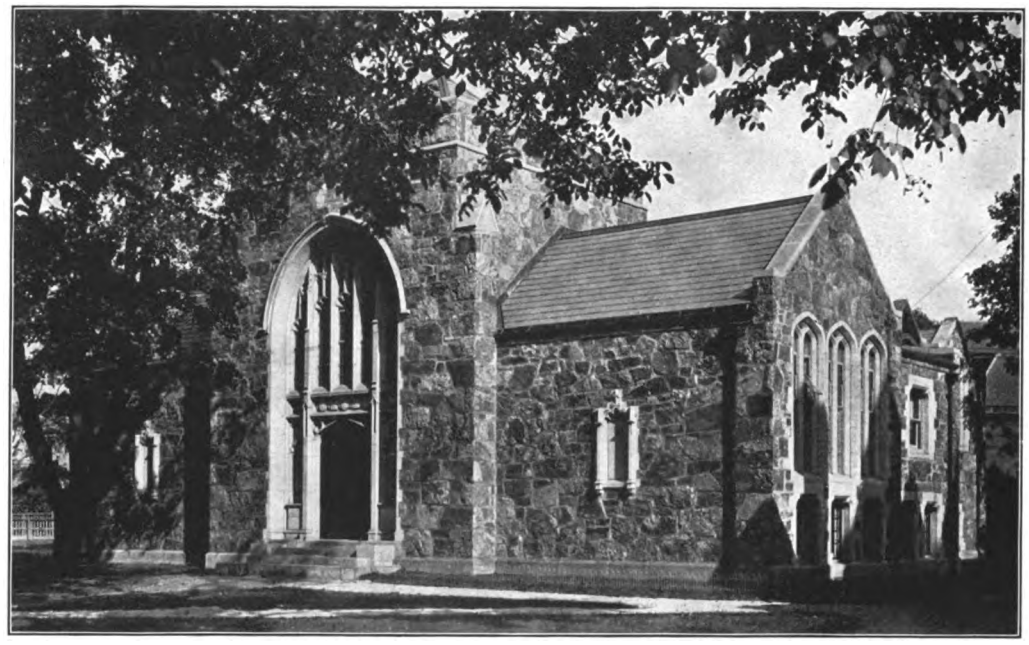
Institutional Libraries

Institutional Libraries of endowed or charitable institutions such as the Y. M. C. A.

The fundamentals remain the same, but their application to the relations of the books, administration, and readers requires more study. With increased size the diversities of use between different classes of libraries become more technical and intricate. One very important

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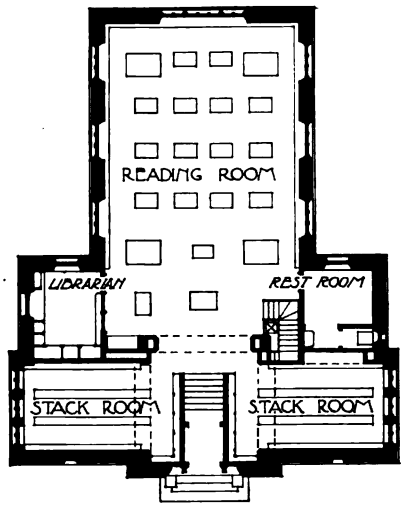
feature in all small libraries is the supervision of the main floor by the librarian from the delivery desk. This enters into the planning of every small library.



LIBRARY OF THE EPISCOPAL THEOLOGICAL SCHOOL, CAMBRIDGE, MASS.

Professional

Professional, subdivided into Scientific, Medical, Theological, Law, and Special or Business. Each requires individual treatment. The users will be so select and responsible that they can be allowed full access to the shelves.



LIBRARY OF THE EPISCOPAL THEOLOGICAL SCHOOL, CAMBRIDE, MASS.

Medical Libraries are generally a part of some institution, used as reference and often in connection with a museum.

Theological Libraries are generally attached to Colleges or Divinity Schools, and only in a few cases are they separate buildings. Some of the books are very large and should be shelved on large shelves.

Special and Business Libraries are very recent and are not fully developed yet.

Law Libraries. The great requisite is privacy and plenty of space for books to be used and constantly referred to. The separate alcove was first used in Langdell Hall of Harvard University Law School and was so popular that it has been copied in all the new libraries all over the country.

Scientific Libraries are general reference libraries.

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Government, Historical

U. S. Government. Libraries for the United States are generally located in the National Capital. One has a separate building, the Library of Congress, the others are attached to the Departments and housed in the Departmental Buildings. They are used much as law libraries are. The reading rooms should be high and well lighted and in a quiet part of the building.

State Libraries are generally rooms in the Capitols and are not generally well adapted to the use.

Historical are entirely reference libraries and should be arranged with particular reference to the comfort of students and investigators. There should also be provision for displaying antiquities and valuable manuscripts in large fireproof safe rooms.

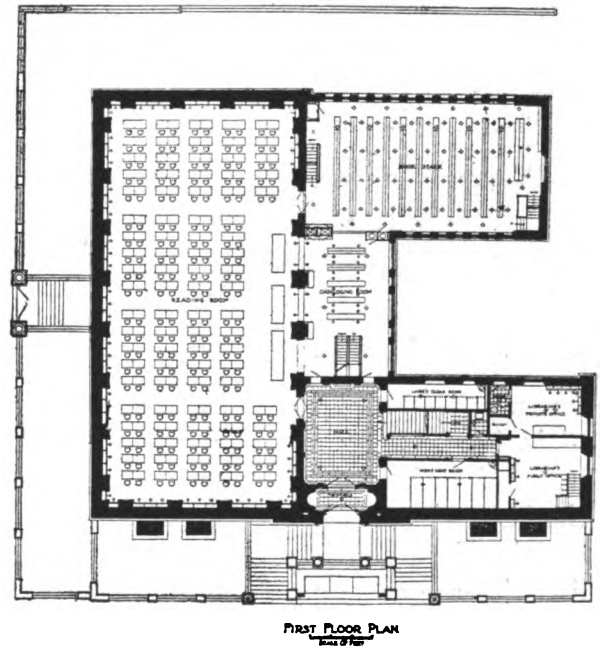
Genealogical and Antiquarian. Antiquities, even literary ones, require different treatment from books. Glass doors for wall cases and glass cases for manuscripts require different architectural treatment with different lighting from the ordinary reading room.

Educational

There are three classes of readers to be accommodated in a University Library, professors, advanced students, and undergraduates.

The undergraduates do not get much time for general reading, and do not need unrestricted access to all the shelves; if they can get at general and special reference books, their own text books, and the books recommended by their instructors, it is all they want.

The professors and teachers and some advanced students may wish to wander at will through the books. They need facilities for examining and selecting books in the stacks, and they need quiet rooms to take the books where they can read, copy, and write.



JOHN HAY MEMORIAL LIBRARY, BROWN UNIVERSITY, PROVIDENCE, R. I.

Many professors want department and seminar rooms shelved for permanent sub-libraries of their own technical books, and for books of present use in their daily classes. They also like to have individual rooms for study and for their records.

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The stacks should be rather far apart with carrels. The main reading room should be well lighted with seminar rooms fitted with wall shelves, plenty of alcoves for the professors, large enough for them to have a typewriter, with glass partitions to keep out the noise, and a table large enough to hold all the books they need. These alcoves can be on one side of the stack. A feasible scheme is a story over the stack with top and side light, cut up into small rooms. Besides these alcoves there should be separate rooms for the head professors. There should be map rooms, special library rooms, and vault rooms for valuable manuscripts.



JOHN HAY MEMORIAL LIBRARY, BROWN UNIVERSITY, PROVIDENCE, R. I.

The unsolved question today is the relation of the departmental libraries to the main University Library. It is generally the custom to separate the Law and Medical Libraries in large universities from the main library. The nearest to solving the problem is the new Harper Memorial Library at the University of Chicago. The border line between the books in the departments and those in the main library is not definite and it often requires many duplicate volumes where the departmental libraries are at some distance from the main library.

Great attention should be paid to the working department to see that the delivery room is convenient to those desiring to take out books and centrally and conveniently arranged to the stacks. The librarian's room should be convenient for him and his visitors, and should be not too far from the cataloguers, who should be near the stack and catalogue cases unless the library is large enough to have a duplicate catalogue,

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one for the public and one for the cataloguers. The cataloguers' rooms should connect by lift directly with the Unpacking Room and Bindery. There should be convenient and ample arrangements for the health and comfort of the staff, rest rooms, etc. In a large library there should be adequate pneumatic tube communication as well as telephone service. It is better to plan properly rather than rely on mechanical conveyors with long horizontal runs and many corners to turn.

Public Libraries

Mr. Poole, the noted librarian, defined the public library as a library established by state laws, supported by local taxation and voluntary gifts, and managed as a public trust.

It is not a library simply for scholars, but for the whole community, the mechanic, the laborer, the youth, for all who desire to read, whatever be their rank and condition of life.

Bostwick says: — The modern ideas of the functions of a public library are lending books for home use, free access to the shelves, cheerful and homelike surroundings, rooms for children, coöperation with the schools, long hours of opening, the extension of branch library systems and traveling libraries, lectures and exhibits, the thousand and one activities that distinguish the modern library from its more passive predecessor.



RADCLIFFE LIBRARY, OXFORD

Branch. The branch library as distinguished from distributing or delivery stations has its own building and deserves as careful study as the main library in a small city.

Branches vary from merely local stations relying on main libraries for most of the administrative work to branches practically independent. One branch library in Philadelphia cost $800,000.

The only real library requisites of height of stories are dependent upon air capacity and reach of light from windows across rooms.

Every new library building is a different problem, and it is extremely unwise to try and copy any existing library. There will be enough individuality in the problem itself to warrant an entirely new treatment. It *is* wise, however, to visit other libraries of similar grade, and design by the process of elimination of the things that are not good.

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Light

It is advisable to use natural light as much as possible both on account of economy and health. The north light is the best for reading, and side light high up is better than light from a skylight. The bindings of books, particularly if leather, are affected by the sun's rays. The modern books and magazines are often finished with a glazed surface, and it is important that the angle of light, both natural and artificial, should be arranged so that it does not reflect into the eyes when the book is on the table. One foot of light in the top of the window is worth two at the bottom, if low, because it allows the light to penetrate far into the room. The ideal light is from behind over the left shoulder.

The color on the walls in reading rooms is a very important consideration.

If there are any interior courts they should be faced with material which reflects the light.

Windows

There should be no stained glass and no transom bars. In German schools window stools are set high and the lower sash glazed with ribbed glass so that the pupils cannot look out.

Artificial Light

The fixtures for the general illumination of the reading room and other rooms used for reading should be high and not strong enough to be particularly noticed by the eyes. The light on the book should also be powerful enough only to make the type clear, but not to over illuminate the white paper of the book, as it soon unconsciously hurts the eye. It is undoubtedly true that the eye is more comfortable when receiving a moderate amount of light from all directions, as it does in daylight, than when getting all the light from a bright page in a dark room. The ceilings and walls, if light in color, have considerable value as reflecting surfaces especially when the ceiling is low.

Heating and Ventilation

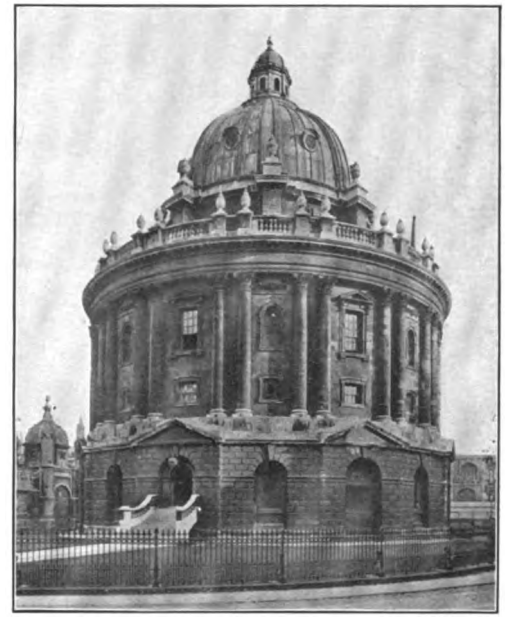
The heating of the smaller libraries is a simple matter and is generally controlled by the amount of money available ; but in large libraries the heating and ventilating during the greater part of the year is one and the same thing. There is a great deal of discussion in regard to the best way of heating and ventilating, and you will find the trustees generally loth to spend the necessary money to give the best results in all except the largest libraries. Now ventilation is a much more important thing in a library than the uninformed person realizes. On it depends the health of the readers and staff, and I might say the books as well as their bindings.

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It is absolutely necessary that in a stack of many tiers, there should be a large air space above the top stack to keep the hot air from cracking the books, and it is evident that in a large reading room, where there are five hundred readers the air must be constantly changing, without any noticeable draft and at a constant temperature.

The best system of heating is indirect hot water, but that requires nearly double the size radiators that steam does. The ducts too are very cumbersome and take a large amount of room. It is also necessary to add moisture to the air that is supplied to the stacks, as otherwise the books soon dry up. The air, however, should not be damp as that also is deleterious to the books.

The plumbing should be first class in every way with ample facilities for the staff, with the men's and women's toilets where they cannot see each other enter. The pipes should not run behind, under or over the shelves on account of danger from leaks. There should be janitor's closets on every floor for the scrub women, and there should be fire hose outlets.



RADCLIFFE LIBRARY, OXFORD

In planning a large library it must first be decided whether the central space, if the building is rectangular, will be used in the form of a court yard, as in the Boston Public Library, or a reading room as in the Library of Congress and the British Museum.

The Boston Public Library, although it has this large court, does not use it for light except in a few instances.

The central space can also be used for the delivery room or for stacks. My own preference is to have a delivery room lighted from the top and connecting with the stacks in the rear and both sides, with four courts instead of one large one, if the building is large enough to give the courts enough area to admit light and air.

In planning a large library, it will be necessary to install book lifts, as there are many tiers of stacks, but remember that the minute you depart from the vertical lift you will get into trouble. These lifts now are generally operated by electricity by pressing a button. The mechanical conveyors for the books in the Library of Congress and the Boston Public Library, are cumbersome and need repairs quite frequently.

There have been quite a number of independent house telephones put on the market since the Bell and Blake patent expired, but the best way to obtain a good telephone service in a large library, is to go to the telephone company and take their advice.

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In planning the administration rooms the essential thing is that the rooms should be arranged so that the work and supervision of it by the librarian will go smoothly. There are four processes: —

1. Unpacking.
2. Cataloguing.
3. Preparing the books for shelving.
4. Placing them on the shelves.

These rooms should be in sequence either horizontally or vertically.

Every library, except the smallest, has a trustees' room.

In a large library it is better to give the librarian an ante room where people can wait, and his own inner office with his own toilet. The heads of departments should also have their own office connected by telephone and tube.

It is also well to have a public waiting room, where people can talk, as silence is required in the reading rooms.

A certain number of rooms in large libraries should be arranged for private studies for authors. They should be away from the reading rooms as the noise of the typewriter is objectionable.

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I. THE PLANNING OF LIBRARIES

THE SUBSTANCE OF A LECTURE DELIVERED BEFORE THE SCHOOL OF ARCHITECTURE

By Dr. HERBERT PUTNAM
LIBRARIAN OF CONGRESS

A WORD as to the published sources of information may helpfully precede a consideration of the subject itself.

A report upon Public Libraries issued by the United States Bureau of Education in 1876 gives a brief review of the evolution of library buildings to that date, and a description, with cuts, of certain buildings of the type then in vogue; and a condemnation of that type. This report is accessible in any public library.

The most recent *book*, specially pertinent to this country, is one published in 1912. It is by Charles C. Soule, and entitled "How to Plan a Library Building for Library Work." It consists mainly of maxims and general advice, with much quotation. The planning of small library buildings is treated in a tract (No. 4) issued by the American Library Association in 1904; and by a chapter (X), issued in 1912, in its proposed "Manual of Library Economy."

The plans of actual buildings may be found throughout the volumes of the "Library Journal" and "Public Libraries," in which they are apt to be published at the time of dedication. Certain of them are, of course, produced in the architectural journals. A list of plans in the possession of the Boston Public Library was enlarged into a second edition in 1899. It comprises some twelve hundred entries.

Certain of the State Library Commissions have issued illustrated bulletins descriptive of local buildings. One such was issued by the Massachusetts Commission in 1899, another by the Connecticut Commission in 1911.

Various buildings of the type aided by Mr Carnegie are illustrated in a "Portfolio of Carnegie Libraries" edited by Theodore W. Koch, Librarian of the University of Michigan, and published at Ann Arbor in 1907.

As to the necessary provision in a large modern municipal library building the most serviceable indication is in the Plan of Competition for the New York Public Library, and the "Suggestions" to the architect of the Brooklyn Public Library, both quoted in full in Soule. A similar list of suggestions applicable to the branch buildings for Brooklyn were

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printed in pamphlet form. The "Architectural Competition" for the St. Louis Public Library in 1907 may also be found suggestive in its specifications.

English buildings are illustrated in a volume by Alfred Cotgreave entitled "Views and Memoranda of Public Libraries" issued in London in 1907. A general manual on "Library Construction" was published in London in 1901. It is by a librarian, F. J. Burgoyne. An English architect, A. L. Champneys, edited a volume on "Public Libraries," published six years later. Both of these enter into minute detail, the latter especially treats of such detail as concerns the architect: structure, materials, heating, ventilation, equipment, and furniture.

An examination of the literature, including the volume by Mr. Soule, will indicate that the principles are few and easily intelligible; an examination of the plans, that they are frequently disregarded: and perhaps most frequently in expensive structures for an elaborate service, where particularly they should have controlled. Especially have they been disregarded in buildings which are the result of private gift. An architect called upon to design a library building would therefore do well: first to glance over the discussions of general principle, and then with a librarian to examine and compare the plans of existing structures. Even without scheduling the details he will then insensibly have defined for himself certain relations to be sought, others to be avoided.

In an elemental sense the function of a library is to produce a particular book desired by a particular reader. But a condition of this and a preliminary are certain processes: —

1. The book must be acquired.

2. It must be represented in a catalogue which shall promptly identify it under any one of three circumstances:

(*a*) If its author alone be known,

(*b*) If its title alone be known,

(*c*) If the inquiry is for a suitable book upon a specified subject.

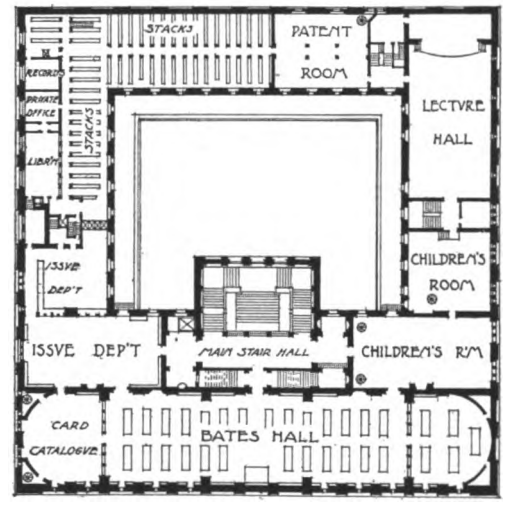
3. It must be so placed on the shelves as to be readily located and produced by an attendant; and in a group relating to the same subject, so that a reader admitted to the shelves may benefit by the classification. And its location must be identified by some symbol sufficiently precise to ensure not merely its prompt production but its certain return: this symbol being reproduced upon the records of the library which constitute its "Shelf-Lists," and also in the catalogues themselves. Incidentally this symbol must be such as, while substantially permanent for the particular book, will permit the indefinite insertion of other books — later accessions — in their appropriate alphabetic order (under their authors) within the subject class. These details are of concern because they imply an incessant continuing relation between the classifier and the collections in the stacks. They may often necessitate the removal, from one point to another, of *masses* of material which have outgrown their accommodations.

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And back of the acquisition of the book, back even of the selection of it, is the organization fundamental to the existence of the institution as such: the board of administration, and the paid executive staff directly under it: that is to say the librarian or director, the assistant librarian, and the group of lower officials concerned with general administration, as distinguished from the specialized work of the several departments.

Logically, then, or rather, physiologically, the first requirement is a room for the trustees; next is the room for the librarian; and third the room, or suite, for the assistant librarian, secretary, and clerical force directly subservient.

The trustees serve without pay; and it is assumed that they are entitled to a location in the building that will both emphasize their dignity and recognize their comfort. It is usually on the front, but not necessarily on the first floor. Indeed, it is usually on the second, ensuring greater privacy, and also leaving the first floor free for public uses. Here comes the first problem of choice. The librarian being the direct servant of the trustees, his office might logically be next theirs; and the business of their actual meetings would be conveniened by this. But these meetings occur at infrequent intervals, not oftener than once a week and usually not oftener than once a month. In the interim the librarian is the servant of the public: he is subject to call, not merely on miscellaneous matters, but by readers in search of the highest authority in some difficulty involving the actual use of the books themselves. And the smaller the staff, the less elaborate the organization, the greater the likelihood and number of such calls. He is also subject to call from the members of his staff engaged in specialized work — whether it be the ordering of books, the classification, the cataloguing, the binding, or the service to the public — the assistance to a reader, or the determination of his privileges. This, which is the incessant demand upon him, must be recognized to the subordination, if necessary, of that of the trustees as a body, which is only occasional. It requires for his office a location contiguous to the order (purchasing and receiving) division, directly accessible to the public, easily reached (preferably without transit of a public way) from the issue desk, and not too remote from the catalogue and classification rooms. In proportion as the organization is specialized and experts are in responsible conduct of its technical work, the frequency of the recourse to the librarian himself, on matters of technical detail,

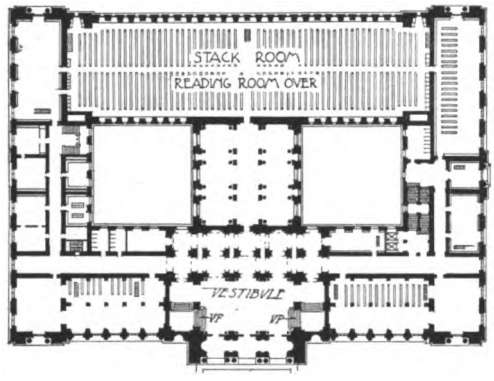


BOSTON PUBLIC LIBRARY

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diminishes; and with it the need of his proximity to the departments concerned with it. So that at the Boston Public Library, for instance, it is no substantial inconvenience that the librarian's office is above the second floor, while all such departments are on the ground floor; or that at the Library of Congress, it is on the west side of the building while such departments are on the east.

Before proceeding, let me interpolate an observation. This is, that there is an entirely different method of approach to the entire problem. This other method considers first the location of the service which physiologically comes last, *i. e.* the service to the reader. It determines first where the main issue department shall be, and where the main reading room; and only then considers the disposition of the other departments. It may even determine first the location of the main reading room or even the façade itself, and then proceed with this as fixed. An apparent example of this course is the Boston Public Library. It is also an instance where it has resulted unfortunately. For the decision that the main reading room should occupy the main front (perhaps influenced, though I do not know this, by an inclination to express this in the facade itself), combined with a determination for an interior court, forced the storage (stack) room into narrow wings, presenting the least, instead of the greatest, surface of books to the issue desk, narrowed the channel of issue so that it became choked, and removed the average book to almost the greatest instead of the least, distance from the reader. An even less fortunate separation results where, the reading room occupying the main front, the stack only the rear wing, the main public staircase hallway is interpolated between them (in place of the central interior court), and the only connection is by pneumatic tube and book railway. This is proposed in a plan for an important municipal library.



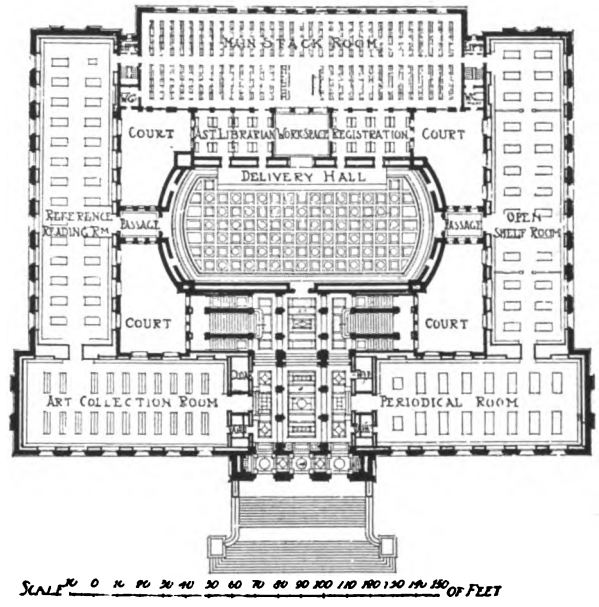
NEW YORK PUBLIC LIBRARY

In the New York Public Library, however, a similarly early determination of the location of the main reading room resulted in no such inconveniences: for with it was combined a determination as to the bookstacks and reference issue which fully regarded the utilities. It was that the reading room occupying the top floor of the rear wing, and the public catalogue and information desk a center room leading to this, the bookstacks themselves should be directly beneath these two. The result is that though their capacity is enormous, — for they stretch clear to the basement, — they present the largest possible surface of books to the center of demand, and reduce the distance of the average book from the issue desk, to the minimum possible in so large a collection. (Unless

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an arrangement were adopted like that suggested by an English librarian some years ago in which the reading room being centered the books were to be housed in shell-like spirals around it, which might be extended at will. The obvious objections to this plan would be that it provided only for reading room and stacks, and extension only for the latter).

In any such building the main architectural feature of the interior is likely to be either the main reference reading room, or (as at the St. Louis Public Library) the main issue or delivery room. Whether and to what extent the psychology of design requires an architect actually to consider first the location of this I cannot pretend to judge. I note merely that there is risk in considering it first: the risk of subordinating unduly the provision for the administrative and technical work and of finally disposing this in unsuitable, unrelated, " left over " spaces, where it will be permanently hampered. The result will be a building which, whatever its superficial impressiveness, is less than organic.



PUBLIC LIBRARY, ST. LOUIS, MISSOURI

Meantime I proceed with the other order, which seems to me more serviceable for our present purposes.

In the acquisition of the book are involved various processes, — the details of which are of no concern to you, except the fact that they exist and the number of them, for they are no less than eleven. In a very small library they may all be taken care of in the librarian's own office; but in a large library, with considerable current additions, they require a separate department, a considerable space, and much equipment. In the Library of Congress for instance, with accessions of some 90,000 books and pamphlets each year, they occupy normally over 3,000 square feet of floor space, and a force of thirteen persons: even though a main labor (the maintenance of an itemized " Accession " register) is eliminated.

In any library, however, the selection and purchase of the books are matters of such fundamental concern as to require the personal control of the librarian himself. They will be convenienced by a location in close proximity to his office: even though the physical handling of the material received (the unpacking) may be relegated to the basement.

The next three stages for the book — before it reaches the reader — are its classification, shelf-listing, and cataloguing. The classification

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(as distinguished from the cataloguing) is the determination of its place on the shelves — within what group (as, American History, or Botany, or other subject division). This group determined (and the decision is often difficult: there are hundreds of classes in our American history alone, and many a book invades several of them): the group determined, the book receives a place in it decided by the place of its author in an "author scheme," and a symbol, which will identify that place and preserve it. The decision is then recorded in the "Shelf-List," which indicates the books exactly as they stand on the shelves.

The record of them in the catalogue is a record under their author, and the subject to which they relate, also under the title, if this differs from the actual subject.

The processes of classification and of cataloguing, that is, of subject cataloguing, are the most technical, and may be the most elaborate of any in the library. In the Boston Public Library they occupy, with the shelf-listing, a force of nearly thirty persons, in the Library of Congress a force of over ninety. They require recourse —

1. To a collection of reference books — bibliographic tools — which are the necessary apparatus of the department itself;
2. To the general reference collection;
3. To the main collection in the stacks.

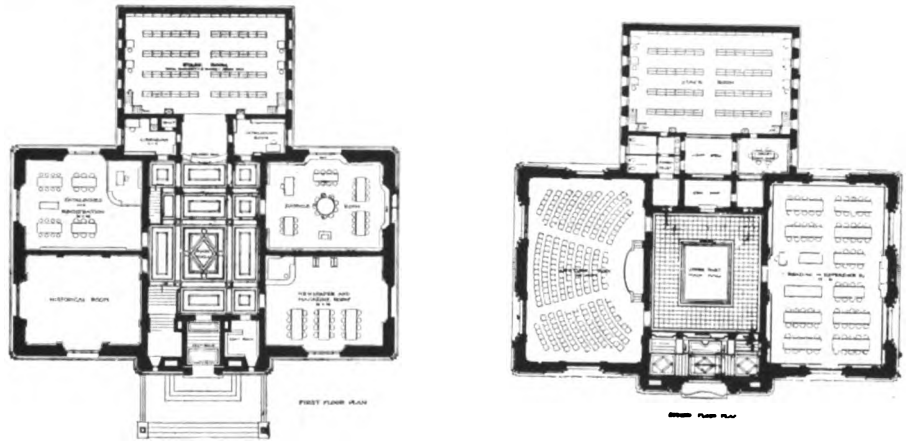
Few libraries can afford the expense of duplicating in their catalogue room all of the books of reference which are the bibliographic tools. It is important, therefore, that such of these as are in the reading or reference room may be reached by the cataloguers without undue delay, or the traverse of a public way. It is still more important, it is essential, that the collection in the main stacks may be so reached: not merely to facilitate the transportation from it of books to be catalogued, and to it of books catalogued and finally classified and shelf-listed, but to enable those required to be referred to in the processes of classification and cataloguing to be quickly secured: and the need of these is incessant. The cataloguing room *must* therefore be contiguous to the stack and with entrance to it purely official. (Incidentally this entrance should be on the level, without sills which would impede the passage of trucks: but this is true of the building in general, all door sills being sunk.)

This preliminary work upon the books involving much continuous strain upon the eyes, the catalogue room should, of course, have the maximum possible of light as well as air.

Turning now to the public rooms. The issue of books is (1) for use within the building and (2) for use at home. In a small library both may have to be provided for at one issue desk; where, however, the organization permits a distinct service, the reference use is provided for through a separate issue desk in a distinct reference room; and the entire issue (home and reference) to children, in a separate children's room.

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The general issue for home use must, of course, be centered in a room readily accessible from the street, and permitting this issue to be carried on without disturbance of the reference readers. In the smaller libraries, this is attained by locating the issue (delivery) room on the main floor directly opposite the main entrance; in the larger buildings with more elaborate organization, it may be relegated to an upper floor, as at Chicago — or at Boston; or disposed of in a wing with a separate entrance, as in New York. The latter arrangement subordinates it; but in the case of New York is justified by the fact that the bulk of the issue for home use is conducted through the branches, the central building being more substantially for reference reading. The relegation to the upper floor, even when there centered, as at Chicago, involves the use of stairs or elevators, to be avoided if possible; even though the present day public is so wonted to elevators for its other transactions. The arrangement at Boston, which provides for the home issue and the reference issue



RYERSON PUBLIC LIBRARY, GRAND RAPIDS, MICH.

at a single desk in a room interpolated between the reference room and the stacks, is of course the least fortunate possible: for it prevents the differentiation between the reference reader and the ordinary reader, to which in a library for research the former is entitled.

The amount of space required for the delivery room varies with the constituency. There must be sufficient to accommodate, at the minimum, the desk itself, the catalogues (and as the modern catalogue is on cards, these require a considerable and increasing space), bulletin boards, some cases for the display of new or suggested books, and seats for at least a dozen persons awaiting their turn. There must also be provision for a desk — generally distinct — where applicants for the privilege are to be registered, and for an information desk, where inquiries are to be answered.

The issue desk proper must be located so as to —

1. Supervise the room,
2. Afford direct access to the stack,
3. Control the exit (particularly in a small library).

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In such a small library the conventional location of this room in the center, with the stack directly behind it, naturally throws the reference room to one side and admits of an open shelf room, or periodical room, or children's room on the other. The open shelf room is now habitually a feature of a library for popular use. It contains, not reference books — which are in the reference room — but books for general reading. The public is given direct access to it, and selects from it books for home use, to be charged at the desk. It is a device towards the greater direct accessibility of the entire collection which is to be sought in *any* library building.

The service to the children, being distinct, need not be provided for on the same floor. It is frequently placed in the basement. So also is that of current newspapers, where this is attempted.

A collection of classic times was a collection of manuscripts, on long sheets, rolled; and a library of the ancients resembled a wall-paper shop. After the book took its present form, the treatment had to be different. The simplest was the mediaeval; of which the usual example is the Library at Leyden: a single room, with the books on cases in the center — cases which provided not merely for shelving them upright and closed, but for consulting them open. Such a room exists today in the Laurentian Library at Florence. As the early printed books were chiefly folios the arrangement was peculiarly apt, incidentally avoiding strain in transportation. But it continued even where the form of the books themselves became varied and where many of them had to be placed in closed cupboards or on wall-shelving. Irrespective of convenience its charm is obvious. It creates an *atmosphere;* and in this respect no room of a modern public library matches that at the Bodleian or that at the Vatican.

The divorcement of books from the reading room was slow and reluctant. The need of clear reading space on the floor relegated the books to the walls; the wall cases were extended in alcoves; and the alcoves multiplied vertically, tier upon tier, until they stretched to the ceiling. Such an arrangement existed in the old Bates Hall of the former Public Library on Boylston street in Boston; it survives today in the Public Libraries at Detroit and at Cincinnati, and in the Peabody at Baltimore. It had its dignity and also its power: for the mere sight of a great collection enveloping him, the consciousness of its proximity, exercised upon the reader an influence which was no mean influence.

But it had also its inconveniences; and it was extravagant. The average book was at a point remote from the issue desk, requiring the traverse of long distances, and these vertical distances; and with a room so high, the warm air rising, a temperature fit for a reader on the floor would be destructive to a book near the ceiling. It was vehemently attacked forty years ago by a librarian, Dr. Poole. Dr. Poole, having soon the opportunity for an experiment in a different direction, went to the opposite extreme; and the Newberry Library at Chicago, planned

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by him, subdivides the collection into a number of smaller units, and houses these in rooms of ordinary height, in cases of a single tier. The subdivision is by subject, and includes a corresponding subdivision of the readers also, provision for the most of these being made in these same rooms. This might be termed the cellular plan. But this extreme involved also its inconveniences. The subdivision itself has not proved practicable: a given subject group in literature is n't fixed, nor therefore the amount of accommodation requisite for it. Certain groups overran their boundaries. Many inquiries involved several groups. A residuum of use had to be provided for in one general reading room. And in-



VATICAN LIBRARY

dependent care and service in the group collections involved excessive expense for administration.

So the example has not been followed, and the Newberry remains an isolated experiment, except as the principle has been applied to certain groups in the New York Public Library, and to Department Collections in University Libraries.

The next stage was the invention of the steel stack. This divorced the main collection from the Reading Room; yet housed it in such a way that, while any subject group could be kept together and in proper subject relation with the rest, and the collection as a whole occupy the minimum

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space necessary at a given moment, there could easily be readjustment of the space as the relative growth of the several groups might require.

To these administrative conveniences was added the consideration of economy. For a stack of steel provides the maximum accommodation at the minimum cost. The shelving is double faced, and while the height of any one tier is not over seven and a half feet, the tiers may be multiplied at will. The aisles need not be over three and one-half feet in width, with a center aisle of five feet. A stack of nine such tiers can therefore provide for some 800,000 volumes on a ground area of but 5,000 square



LIBRARY OF TRINITY COLLEGE, CAMBRIDGE

feet. And it is reckoned that on an ordinary city block a building — consisting primarily of stack — could be erected to accommodate a hundred million volumes.

Coincidently, the electric light and systems of artificial ventilation have rendered such a stack independent of natural light or of window ventilation. It might indeed be constructed down, as well as up; and has been at Oxford and in Vienna. At Washington a surface stack has been built in an inner court whose light and ventilation are both exclusively artificial; and those originally constructed have only artificial ventilation, pure air being drawn in below and the foul drawn off above, by fans. The stack windows are sealed. The ability thus to clean the air before introducing it — by passing it through mesh, or as in the enclosed stack of the Congressional Library, through cross sprays of water, — thus also freshening it, — conduces greatly to both cleanliness and

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hygiene. It solves the problem of housing a great collection in a city where otherwise it would become soiled and gritty from smoke and dust.

A tiered stack represents, to be sure, vertical spaces to be traversed; but elevators, pneumatic tubes, and book railways overcome or offset these. As a matter of detail, however, these things following should be noted: (1) that the railway at present suffices only to bring individual books to the reading room, — their return in masses to the stack must still be provided for by hand and by truck; (2) the increasing disposition to admit the serious investigator to the shelves requires comfortable provision for him in the stack itself: aisles sufficiently wide to avoid jostling, and tables or ledges, with seats, — incidentally also, for his sake, as well as that of the service, avoidance of spiral staircases; and (3) that a like disposition to convenience, to interest, and to inspire the general reader, requires the retention in the reading room or in open juxtaposition to it, of a large number of books for home reading as well as for reference. This disposition is offsetting the tendency to segregate the material in a close and closed stack. In the smaller libraries it induces the location of it on accessible bookpresses, in spaces near the issue desk and not even walled off from it: so that any reader may, without formality, reach any book in the collection.

In general, however, and for collections of large dimension, the tiered stack is the accepted solution. Many types have been devised, but their differences are only of detail. All have adjustable shelves. In some the shelves are sheets of smooth metal, in one, of hollow steel strips, in some still of wood. To metal there is no objection on the ground of injury to the books; for the finish is sufficiently smooth to prevent this. To wood, on the other hand, there is no valid objection on the ground of risk from fire. In fact, this objection is in general largely fanciful. Heat sufficient to burn both wooden cases and the books upon them is equally likely to warp metal shelving, so that the books upon it, if not ruined where they stand, will tumble into the flames below. And to substitute metal for the superior charm of wood solely on the ground of greater safety from fire is, I think, a sacrifice quite superfluous. It is certainly unnecessary in the single-tiered cases in a reading room, and quite absurd in a private library.

Formulae for the calculation of accommodation are given in an article by Mr. Tilton, architect of the Springfield Massachusetts library building in the September, 1912, number of the " Library Journal."

In estimating by the linear foot of shelving, an assumption of ten volumes to the running foot is usual, eight safer. The normal depth is 10″ to 12″. A greater depth to the three lower shelves is occasionally contrived with the incidental convenience of affording a ledge just above them [as at Minneapolis]. As, however, this results in narrowing the aisle, it is less usual than a distinct provision for the books of larger size — dummies taking their places in the regular subject groups.

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In the conventional American stack of the sort described above over one-half the space is absorbed by the aisles. A device to obviate this loss has been tried with success at the British Museum, and in this country at Bowdoin College. It consists of double faced book "presses" hung on sheaves, which run along a metal track so that the entire press can at will be pulled out into a center aisle. The presses can then stand face to face at an inappreciable distance apart, and all side aisles are eliminated.

This device has recently been applied to the new underground stack at Oxford. Its economy is such that in an area of but 163,000 cubic feet (126′×72′×18′ [height]) accommodation is claimed for a million volumes octavo.

The ventilation of this stack, by the way, reverses the system generally current: the warm fresh air being forced in above and the foul drawn off below. The explanation as given by the authorities is that nature must be "worried," eddies and whirls being created, so as to interrupt her placid course. It is claimed that in this way less opportunity exists for the stagnant corners such as exist under the ordinary system.

The cost of the stack at Oxford was but $60,000. The inside above ground stack at the Library of Congress, although equally exempt from walls, with no greater accommodation, cost $325,000. This seems to indicate that the estimate for the Bodleian stack is over sanguine.

The dimensions of the normal stack in the Library of Congress are as follows:

Height of each tier.	7 feet (deck to deck).
Depth of each shelf.	12 inches.
Depth of newspaper shelf.	22 inches.
Depth of music shelf.	13¾ inches.
Length of ordinary shelf.	3 feet 2 inches.
Length of newspaper shelf.	2 feet 4 inches.
Width of side aisles.	3 feet 4 inches.
Width of center aisles.	6 feet.

The stack is metal, the shelves of hollow metal strips. It is adjustable, and fixed at a desired level by set pins following ratchets in the uprights. Book supports, also of metal, travel on the shelves and can be set at any desired point. In estimating accommodation 20 volumes may be assumed for each tier to each square foot of floor space: so that a floor area of thirty by forty feet, with three tiers may house 72,000 volumes.

The atmosphere best for a book is the atmosphere which is best for a man. A temperature above 70° is excessive: 65° is more wholesome. Air tight cases are to be avoided and, save for dust, a grilled front is preferable to glass, where any defense of this sort seems necessary. Passive dust is not in itself injurious to books: but completely passive air may be.

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For cleaning superficial dust from the books themselves a suction hose is in common use.

For the reading room, the requisites are: —

1. A location convenient of access to the stacks.
2. Ample natural light.
3. Floor space and accommodation for the maximum number of readers anticipated at a given time.
4. Shelving for a collection of reference books.
5. Cases for the reference card catalogue (unless in a separate room as at New York).
6. A delivery desk so placed as to admit of direct official access to the stack without transit of the reading space: unless the calls are sent by pneumatic tube, and the books by a book railway, in which case the desk may be placed in the center of the room, as at Washington and New York.

In a small town library or in a branch of a city library the home issue of reference reading may be combined in a single room. The avoidance of partitions reduces the cost of supervision. It also gives a more spacious and airy effect. It results, however, in diffusing the noise incident to the service at the issue desk: and except at Springfield it has been customary only in small town libraries or branches of a city library, where little research reading is attempted and where also the cost of supervision must be kept at a minimum.

In any case the issue desk should control the exits from any spaces where books may come into the hands of a reader. This is contrived in all of the more modern buildings of this size and type. The main stack is preferably directly to the rear of it. A radial form is sometimes used with success: its purpose being to focus the supervision (from the desk), to improve the natural light on shelves as well as desk, and to conform the scheme to that of an assembly room in a lower floor. Its use at Springfield was determined by the first two motives alone.

The natural light for the reading room should come from windows above the horizontal line of vision of a person seated at a reading table. Windows starting from the floor level are, therefore, to be avoided. The windows in the Octagon of the Library of Congress are so placed — just beneath the beginning of the dome — that no ray of sunlight ever intrudes between a reader and his book.

The accommodation necessary is reckoned by Mr. Tilton as thirty square feet of floor space to each reader. This, of course, includes aisles. The provision necessary for catalogues and reference books will vary with the library; but it should be ample. It is generally under-estimated.

The pressure for extension will be apt to come rather on the stack than on either administrative or reading space. *No* library building yet constructed has provided for an indefinite future. None has even foreseen the actual growth of its collections during the decade following its completion. None *can*.

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The only feasible course is to build for, say, the ensuing twenty years, but with sure provision for an extension of the stack that will still leave the building organic.

The elementary departments of a library are stack, administrative and issue departments, and reading room: with the janitor, storage, cloak, and toilet rooms naturally subsidiary. But to these may be added provision for other uses responding to the more varied activities of the institution: a differentiation of the reading and reference space — so as to provide separately for newspapers, periodicals, documents, patents, maps, music, prints; the service to children and that for the blind; distinct rooms for classes and " study clubs "; an assembly hall for lectures and meetings; a photographing and dark room; a binding and printing office. An occasional combination requires provision for an art gallery, as at New York, or museum, or both, as at Pittsburgh and Minneapolis. The internal requirements of the spaces for each of these are matters of detail which I need not go into. The number and variety of the uses to be foreseen in a modern municipal library are exemplified in the building at New York, and the proposed building in Brooklyn.

In considering their location the fundamental consideration should be that the prime service of the library in the service of *books* should not be subordinated or interfered with by the added activities of the building as an art gallery, or a museum, or its provision for a special group of students or readers. Still less must it be interfered with by the intrusion of the mere sightseer. Decorative embellishments likely to attract the latter should, therefore, be avoided in the spaces devoted to serious reading or even those concerned with the service of books, and the reader, or borrower, should be protected in his immediate and direct contacts with the service of the library as a library, distinct entrances and exits being provided for visitors to the special collections or the assembly room. Two departments are always by preference on the ground level: the newspaper room, and the room for the blind, if such be provided.

Among the administrative rooms should be a lunch room and a rest room for the staff; and in a large municipal library a room for an apprentice class.

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THE ARCHITECTURAL QUARTERLY
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THE RELATION OF A STATE-WIDE BUILDING CODE TO HOUSING AND TOWN PLANNING

BY CHARLES W. KILLAM
ASSISTANT PROFESSOR OF ARCHITECTURAL CONSTRUCTION IN HARVARD UNIVERSITY

THE Governor of Massachusetts has appointed a "Commission to Investigate the Building Regulations in Force Throughout the Commonwealth" and it is interesting to consider how the work of this commission may affect the work of housing and town planning.

The state of Massachusetts at present has its district police laws, and the cities and a few of the towns have local building ordinances varying from the 7-page pamphlet of Lawrence to the 97-page book of Brookline. Some of these ordinances are entirely inadequate, not only in the number of subjects covered, but in the way they are treated. They do not agree as to certain fundamental things, which may well be uniform throughout the state. The work of the local planning boards and of the Massachusetts Homestead Commission has much to do with housing. Many of these local building ordinances have inadequate treatment of the housing problem or no treatment at all. The inspection is not unified. The cities and larger towns have local inspectors in control. The district police, except in Boston, have a state-wide control of matters of safety from fire and of the sanitary and ventilating equipment in certain classes of buildings. The state and local boards of health have certain powers in regard to some buildings. The fire commissioner of Boston has part control over certain classes of buildings which may be unusual fire or explosion risks. There is thus much diversity in the requirements in different places, some overlapping of inspection, some conflicting control, some difficulty in finding out what regulations apply in any given case, and some laws admittedly not enforced.

The state commission on building laws hopes to bring about uniform requirements throughout the state, including Boston, for such fundamental things as floor loads, strength of materials, precautions against fire, and perhaps for housing. It also hopes to simplify and coördinate the administrative authorities so that the expense of double inspection can be saved, and so that builders can easily find out what regulations they must follow, and be relieved from any conflicting control.

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Such a state-wide building code affects the work of town planning particularly in the matter of housing. We are all interested in obtaining healthful houses, built to be safe and durable, with minimum fire hazard, at reasonable cost, and built under regulations not unjust to property owners. These are no merely technical questions of interest only to architect and builder — they affect every one of us in our cost of living, and in our comfort, health, and safety. Building regulations which allow a bending strength of only 800 lbs. per sq. in. for spruce in Brookline, as compared with the 1000 lbs. allowed in Boston, penalize Brookline by making its construction more expensive; and if the 1000 lbs. is safe, Brookline is wasting its money in putting in the extra spruce which is used in practically every house. Lynn requires floors of dwellings to be strong enough to support 100 lbs. per sq. ft., while Everett requires only 40 lbs. If the 40-lb. load is enough, then Lynn's extra timber is an unjust expense. If Watertown requires its 3-story tenements to have a 25-ft. back yard while Brookline requires only 10 ft. for any height, then Watertown is unduly conscientious, or else Brookline is too easily satisfied. Belmont requires 3-story tenements to be fireproof, while Cambridge allows 6-story apartments with wooden floor construction.

Is this great diversity in important requirements desirable, or should there be uniformity throughout the state, with backward cities and towns brought up to a reasonable standard ? What shall we do in the matter of housing, for instance ? The legislature of 1912 passed " An Act Relative to Tenement Houses in Towns " (Chap. 635), and the legislature of 1913, " An Act Relative to Tenement Houses in Cities " (Chap. 786). Both of these laws are permissive — not mandatory. They were drawn up by the committee on housing of the Massachusetts Civic League in consultation with some volunteer experts whom they called in, and they present the extreme housing reformer's point of view. They were made up without consultation with real estate owners and builders, without sufficient consultation with architects, without investigation of the actual results of other advanced laws lately adopted, and hence without sufficient knowledge of the probable effects of their drastic provisions.

The Tenement House Act for Towns has for its salient provisions: application to houses for three or more families, modification of law prohibited unless in the direction of further restrictions, state board of health given power to examine into enforcement of law, no tenement higher than four stories, yards and courts much larger than in existing laws, no small air shafts allowed, no wooden tenement house over two and one-half stories, 3-story tenements fireproof, annual registry by owners, no board of appeal. The Tenement House Act for Cities has many of the same provisions as the act for towns, but applies to tenements for two or more families, but with narrower yards, higher buildings, 5-story tenements fireproof, and Philadelphia tower fire escape as one method of egress. Both laws require 5-ft. increase in yard widths for each additional story

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in height as compared with the 1 or 2-ft. increases common in existing laws. The city law omits the usual reference to percentage of lot covered, but fixes court and yard widths in reference to heights so that the restriction by percentage is not necessary. Another provision, original I think with the city law, is the method of limitation of heights by allowing one story for each ten ft. in width of the street. It would take too much space to discuss these laws in detail, but I believe they show a too ready acceptance of Lawrence Veiller's model law, with too little investigation of its probable effects. They are too drastic to be accepted without much fuller investigation. They err in allowing the outside iron fire escape as one method of egress — a dangerous makeshift which should no longer be permitted on new buildings. Both laws make a great mistake in omitting a board of appeal; a body which is absolutely essential to the just solution of the many problems which must arise under any law of reasonable length. An owner should be able to obtain justice without appealing to the superior court. These permissive laws apply to housing only, and they are likely to be poorly related to the varying general building ordinances existing in the different cities and towns. A housing law should be an integral part of a general building law so that there may be no conflicting provisions and no gaps.

The town law has been accepted by 14 towns out of a total of 320. (Arlington, Belmont, Braintree, Lexington, Milton, Nahant, North Andover, Stoneham, Walpole, Watertown, Wenham, Weston, Weymouth, and Winthrop.) No city has accepted the city law. The towns which have accepted the town law were probably largely influenced by a desire to adopt its prohibition of the wooden 3-decker. Towns which shut out all cheap housing have not settled the housing question — cheap housing must be provided somewhere and we are looking at it as a state-wide matter. Brookline, although retaining a town government, has the population and apartment house problems of a small city, and its law, recently carefully revised by a representative committee, is far less drastic in its housing provisions than the permissive law for cities. The housing provisions in the other existing city laws are also far less severe, and few of them seem likely to adopt the new law. It is still less likely that all of them will adopt it. I worked many months on the city law with the Civic League committee, was overruled by the other members of the committee in attempting to keep it moderate, and have felt compelled to advise against its adoption in my own city, Cambridge.

Our commission must face the problem presented by those permissive laws with high standards, co-existing with many more ordinances with much lower standards. The question of proper housing is not a local issue; it is a state-wide, a national issue. Unhealthful tenements in Cambridge are a charge upon the whole state as well as upon Cambridge. A fire in Chelsea is not paid for by Chelsea alone; the whole country pays through the insurance companies. Even if a few cities adopt the permis-

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sive law with its high standards, we shall still have many other cities building under much lower standards, and the whole state suffers when any city has dangerously low standards of housing. It seems clear, then, that the practical solution is to prepare a housing code as a part of a general building code state-wide in scope, requiring certain minimum provisions which present-day knowledge approves, and classified, if you will, by population, so that cities with expensive land and congested population may have provisions adapted to their conditions, while small towns may well call for wider courts and yards, and generally more liberal provisions. It may be well to leave to the localities the power to raise the standard but not to lower it.

Such a code, if prepared by our commission, will be written by architects and builders familiar with the technical questions involved in a general construction code, and not unaware of the social and economic questions involved in a housing code. We have already consulted some of those having to do with the enforcement of building laws, and we shall try to consult fire protection experts, real estate owners, housing experts, and any others who can give us aid. We particularly need thoughtful and unbiased aid of experienced people. Any bill prepared by us will undoubtedly require higher housing standards than those existing in most cities and towns, because their regulations were, many of them, drawn up at a time when the question was not so well understood as at present. On the other hand, we may require less onerous provisions than those of the permissive laws for cities and towns, although we shall give their promoters every opportunity to aid us. If we do not satisfy them, they may oppose us because our standards are not high enough, and, on the other hand, we may also be opposed by some who may fight for the retention of the present low standards in some places. Perhaps the opposition of these two widely differing parties may suggest that somewhere between the extremes lies a reasonable mean. Even such a reasonable mean would no doubt raise the first cost of building and would limit the amount of housing to be furnished on any given lot. This limitation of an owner's power to selfishly develop his property to an undesirable maximum capacity is justifiable, if, on the whole, the community will be a gainer; but the decision as to how far the limitation ought to extend is difficult. It does seem fair, however, to require fire precautions which, although increasing the first cost, will in the long run save money for the owner as well as being better for the community. On the other hand, any law so drastic as to discourage new housing leaves us saddled with old buildings which, under more reasonable laws, might be replaced by new and better ones. No amount of sentimental talk of " considering the man before the dollar " will do away with the facts that it takes dollars to build ideal tenements, that the owner expects and has a right to expect a fair return, and that if you make houses over-expensive, the poor man will enjoy them from a distance — he won't be able to hire them. Don't make a man

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spend a thousand dollars for a benefit that is only worth a hundred. If, by too drastic laws, you restrict the occupation of valuable land near the center of a city, you may say that it will drive people to the cheaper land in the outlying areas. Will the outlying land remain cheap under those conditions ? Is it an unquestionable advantage to drive people to the outskirts ? One can imagine an ideal housing law in New York City that would so limit the population per acre that the man who lived in the outskirts would hang onto a strap as far as Peekskill instead of to the Bronx. He might prefer to spend some of his time with his family. A radical housing law must have a radical effect upon property values, and before radical changes are made, their sponsors should follow them through to the bitter end and let us know what they mean.

It is to be hoped that the Homestead Commission can help us by furnishing facts, not theories, as to the actual effects of the most advanced housing laws. We should like to have them tell us in feet and inches, in dollars and cents, by plans, by photographs, by bacterial count, if you will, just how the housing laws of Columbus and other advanced cities have worked. What provisions have proved good ? what not worth while ? how can they be improved ? When we drew up the tenement house law for cities, we had very little information as to actual results in Columbus. We should have had it. It would take some money and some time on the part of unbiased experts to get those facts from building plans, from the buildings themselves, and from all kinds of people in Columbus and in other cities, but the facts are worth getting, because of the magnitude of the interests involved in any housing law.

A building code affects the layout of new streets and lots. A 40-ft. lot becomes useless for a wooden dwelling if a code requires a 10-ft. setback from each side-line, because it leaves only 20 ft. available for the house. If the adjoining lots have existing buildings upon them close to the lot line, then even a 50-ft. lot may be unavailable for a wooden dwelling. When severe setback restrictions prevent an owner from building a one or two-family wooden dwelling, open to light and air all around, he may have to build a brick tenement several stories high, with party walls, and with light only from front and back. Such a brick tenement is somewhat safer from conflagration hazard than the one or two-family wooden house, but it seems to me to be far less desirable as a home. If we insist upon unnecessarily wide setbacks from the side lot lines, we may require a lot for a separate wooden house to be so wide that the expenditure for land may be too large an item for a poor man. An additional strip 10 ft. wide may add several hundred dollars to the price of a lot and those extra hundreds may prevent the man from buying. The wider lots also mean longer distances and greater municipal expenses for streets for a given population. The wooden house for one or two families seems to me to be the natural and desirable development for the outlying areas of cities, and the higher brick tenement with party walls should be considered a

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necessity only when the growing city makes the land too valuable for the small houses. It would be still better to build these small separate houses with brick, terra cotta, or concrete walls and thus somewhat reduce the conflagration hazard, but they will not eliminate it, as long as the house has ordinary wooden window frames with thin glass through which fire can pass, and also wooden cornices, piazzas, etc. I am inclined to believe that one and two-family houses should be classed together in a housing code, defining a tenement house as containing three or more families, and that every reasonable encouragement should be given by the code to the small houses.

The depth of a lot is a factor in its development. Cambridge has lots varying from 30 ft. up to 200 ft. in depth. A law which allows no rear tenements makes it difficult for the owner of a deep lot to develop his land with small tenement houses — he must build a large one, although the large one may have much less light and air than two small ones. It may be said that deep lots are a mistake; that streets should be cut through, but these remedies are much more easily suggested than accomplished when a locality is built up.

These existing difficulties suggest, however, the means by which much trouble in the future may be avoided, and here the local planning boards may well be effective. If experience has shown suitable widths and depths for lots for different circumstances, it is to be hoped that the Homestead Commission can gather the information and put it into the hands of town planning boards, and that the local boards will find a way to plan the development of the newer parts of cities and towns so as to avoid undesirably deep, shallow, or narrow lots. It seems trite to say that such planning of outlying areas should be directed by a unified authority, should precede building operations, and should not be left to the often misguided fancy of each speculative builder who cuts a large area up into streets and lots.

While housing and town planning are, first of all, practical matters of providing healthful and safe homes with pleasant surroundings and with convenient ways of communication between homes and business, it is also worth while to make a thing good looking as well as convenient. It is to be hoped that the local planning boards will not construe their duties too narrowly, that they will watch their town as they watch their own front yards and help when necessary. There ought to be some watchful and intelligent body in every town to keep it clean, to save it from unnecessarily ugly public improvements, and even to make it beautiful. Let no one apologize for wishing to make a town beautiful. The local planning board, if properly made up, might well be such a watchful guardian of the town's appearance; not that such a body should confine its efforts to geraniums in front of the town hall, but that it should see that everything on the public streets from a lamp post to a grade crossing elevation is designed or approved by someone who knows and cares

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about appearances. The local planning boards should have an architect and a landscape architect as members to help in protecting the town from unnecessary ugliness and to aid in developing it in a beautiful way. I have seen a grade crossing elevation close to a railroad station managed in such an ugly manner that the stranger entering the town is repelled rather than attracted. There was no one representing the town capable of knowing and insisting upon an attractive solution of the problem, very likely possible without additional expense. In contrast with this town, the treatment of all the surroundings of the entrance to Belmont was evidently carefully studied, and its attractiveness adds dollars to the value of every house and lot in the town. And it does more than raise property values. We earn money to buy comfort and enjoyment. We pay more for a good looking house in a good looking neighborhood because we enjoy these things. Some day we shall pay more to make the whole town clean, and beautiful enough to enjoy living in it. The more progressive manufacturers are making their factories better looking and surrounding them with neat grounds. The Boston Elevated Railway tries to make all of its structures as good looking as possible. A city or town should be no less particular. It should be particular in what it allows corporations to do, and in what it does itself. The typical street has too much mud, too much bad paving, too many dead trees, too many glaring signs, too many and too ugly poles, too many poorly designed structures of all kinds from lamp posts to bridges. France and Germany have much to teach us in shipshape municipal housekeeping in regard to the externals — the things we must all see every day as we go through the streets. Why not have them such as can be enjoyed instead of endured ?

Does this sound chimerical ? Not if we have a proper civic pride. If I were a New Yorker, I would n't brag about the Harlem Speedway or the " Great White Way "; I should be afraid that the visitor might notice the municipal housekeeping of the side streets. If I lived in Newark, I would n't brag about the court house; I should be ashamed of the fact that the right of way of the Pennsylvania Railroad is better kept than the part of the city through which it runs. I should like to have the whole of my city stand inspection as well as my house. If your cellar and back yard are as clean as the front yard, why not have the whole town as presentable in its back streets as in its parks ? We use the streets more than we do the parks. A city should stand inspection of the cells of its lockup as well as the grass in front of the city hall, should stand inspection of its poorest streets as well as of its best, should have its apartment houses safe as well as expensive, should have decent housing for all, should have nothing to hide from a visitor. We should have such a town that we can be proud of the whole of it — the business or the residential part, factory districts or parks, rich neighborhood or poor. Thoroughgoing democracy should give to all, clean, safe, healthful, and, as far as possible, beautiful housing and surroundings.

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I. THE SCHOOLHOUSE PROBLEM

THE SUBSTANCE OF THREE LECTURES DELIVERED BEFORE THE SCHOOL OF ARCHITECTURE OF HARVARD UNIVERSITY IN APRIL, 1913

By R. CLIPSTON STURGIS
FORMERLY CHAIRMAN OF THE BOSTON SCHOOLHOUSE COMMISSION

Elementary Schools

I SHALL divide the subject of schools into three divisions. First I will take up the elementary schools. By that I mean all schools included in the public school system up to the grade of the high school, — the first eight years in school. Then the secondary schools will be discussed, and here I shall confine myself to secondary schools that are day schools, in other words, the various kinds of high schools in a city. Thirdly, I I shall take the secondary schools that are boarding schools. You will see how, step by step, the problem to be solved becomes more and more complicated.

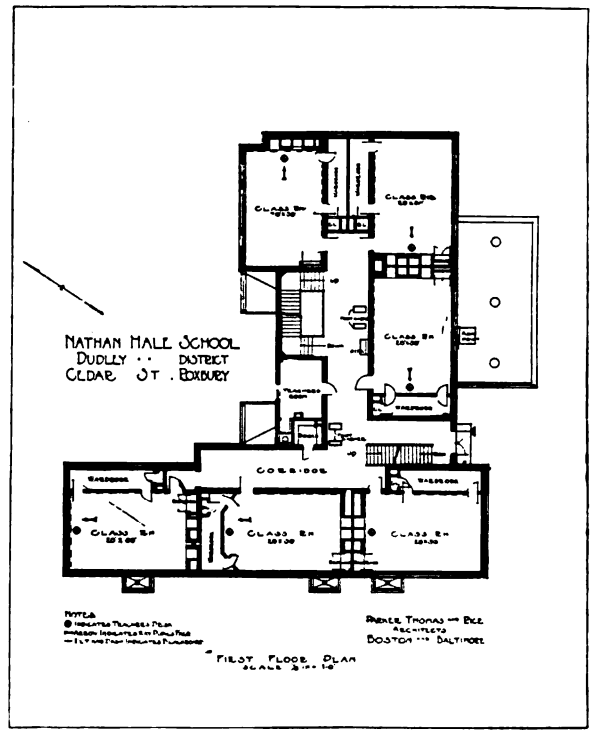
I am going to talk about a perfectly plain practical problem, and present it to you in a way in which you could practically judge every one of the drawings submitted as solutions in a given actual case, just as you could test a mechanical problem and know whether the answer were right. I am going to give you a problem so simple that if you had it to deal with you could, from the practical point of view, say which one of you had solved it best. That is the sort of thing that we must do all the time in real life. We are put to design an office building. Where would the owner be if we presented something of pure design. He would want to know exactly how many square feet of space he would have to rent, and if he could rent it for $1.50 per square foot; he would have to be shown that you had given him a plan that would have no space wasted in things that were not going to give him any rent; and you would have to take the practical problem of serving the people in there with elevators or staircases. It is exactly the thing you take up in the subject we have to do with, — schools.

The lower elementary schools throughout this country contain, as a rule, nothing except class rooms. There is no head master. They do not teach outside of the class room. The teachers are busy in their class rooms all day while they are in school. And the school is usually of one session. The building is made up of a series of simple units.

Take, then, for example, a room such as is used today in the city of Boston to accommodate forty-two pupils. That would mean six rows

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times seven of desks going into that room. And the desks are of certain dimensions. They are a certain distance apart from each other, sufficient to allow passage. So we have got to start with a definite problem of how best to arrange those desks in the most economical space. And it shows how little a problem of that kind appeals to one who does not think architecturally, that when the school committee, an inexpert body so far as architecture is concerned, first began reducing the numbers in class rooms, they reduced it to forty-four, which did not mean anything in the way of rows. That meant 6×7 and two desks left over, which was an awkward number to handle. Of course, as a matter of fact, we disregarded it and made it forty-two.

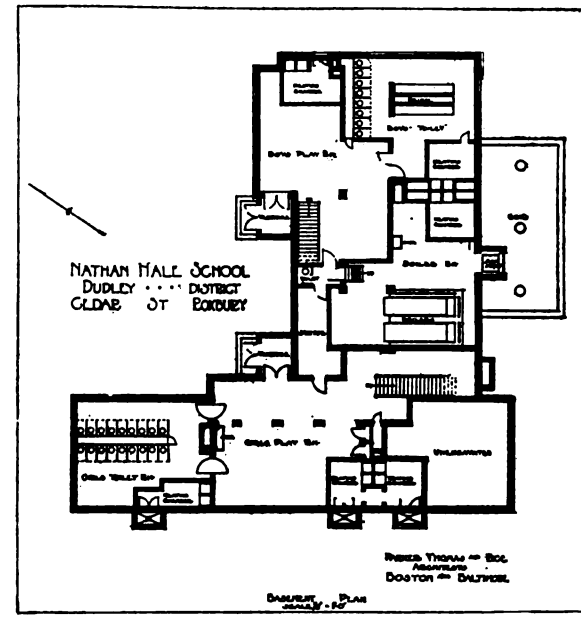


NATHAN HALE SCHOOL, ROXBURY

That is the first problem to consider. Consider just exactly what you would do if you had the problem placed before you of planning four such rooms in the most economical way, so that they would be conveniently related to the corridors and to the exits. That practically is the chief thing you must consider so far as planning is concerned. Bear in mind that if you have four rooms all on one floor, then you have a larger basement, and more outside walls than if you make it in two floors. But if two floors, you must have two exits, two sets of staircases. Work it out and see which gives the compact result. Take any particular circumstances you choose, fixing the points of the compass and the grades, and try a half dozen different solutions of that problem. You can judge your own results, because you can find out what is the most compact cube into which you can get that number of pupils. Bear in mind, in laying out such a unit, and in putting the units together, that two or three things are generally accepted: first, that unilateral lighting is better than lighting from two sides, and, second, if you can get some sunlight into your class room in the course of the day, it is much better than getting a class room that has no sun in it at all; remember also that you must accommodate the coats and hats of the pupils. We consider the best way to be, to make a room for the wardrobe at the end of the class room without connection with the corridor. You must control the children that go out of that class room; and although there are differences of opinion, I personally believe that one door, at the

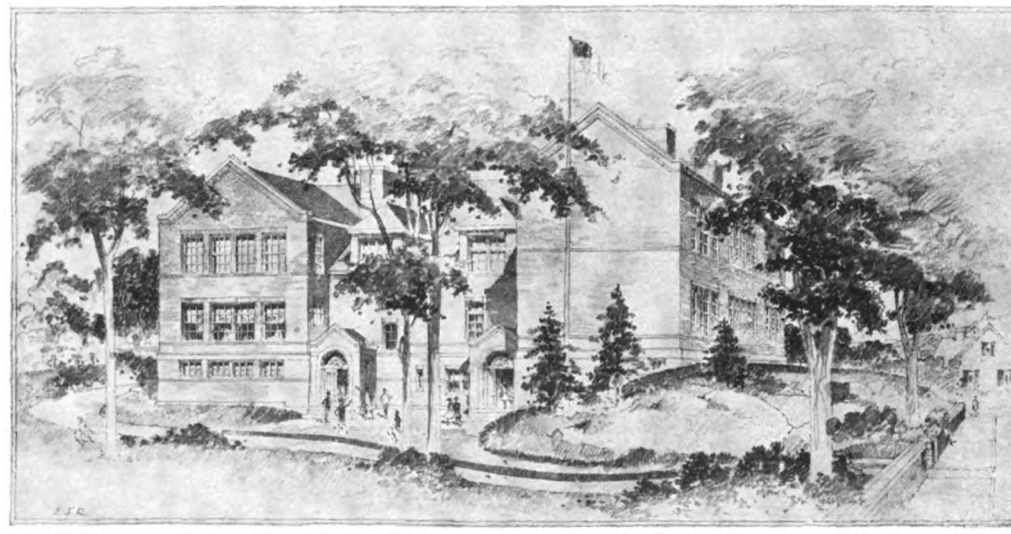
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end of the room where the teacher is, is the best way to control the children. If they want to go out in a hurry, it is much better to go out by the door where the teacher is, and by no other. If there were a door at the other end also, it would make confusion, and the likelihood of panic if there were anything to frighten the children.



NATHAN HALE SCHOOL, ROXBURY

Take units of say 23′×29′ and put them together, and see what result is obtained with the cube of the building. To get the result you must determine at once the height of the rooms. What is the fundamental requirement in regard to height? Just one thing; and that is lighting. It is simply a question of being able to get enough light in the room to carry through to the far side. Then you must put the roof on the building, and you must get space enough underneath the first floor to take care of the heating apparatus. The room described above is the ideal room. It does not follow that



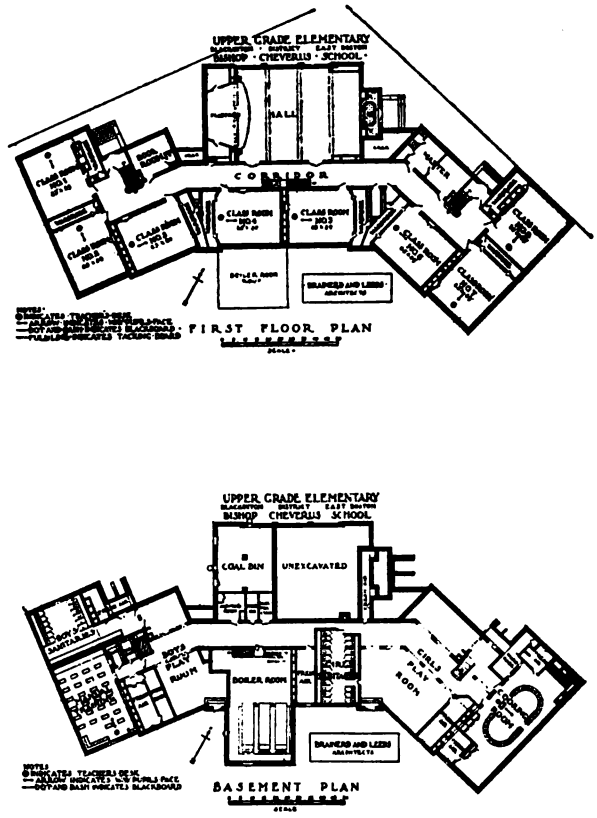
NATHAN HALE SCHOOL, ROXBURY
Parker, Thomas and Rice, Architects

you can get all your rooms ideal, that is, that all will have southeast or southwest exposure — and that you will always be able to get your door in this ideal relation to the wardrobe and the teacher's desk; but take this as the ideal, and get as near it as you can. You must

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take care of your aspect, your points of the compass, the grades on the outside, the heating, the lighting, and the plumbing. The heating means that you must provide inlets for warm fresh air into the room, and an outlet for air partially vitiated. And if you decide that you will not provide the whole of your heat in that way, it would mean that you would have to supplement it in the room, by direct radiation underneath the windows; and bear in mind, if you do that, that you cannot put little children within 18 inches of a hot radiator. All these things you must think of at once, in a thing so simple as this problem of arranging four or eight units, and putting them together so as to make a satisfactory plan.

When you pass to the next grade of school, you come into a field of much more complicated problems. You have class rooms as before, but in addition, under the normal conditions, in New England, at all events — and they obtain more or less all over the country — you must provide for an assembly hall that will seat nearly the whole of the school, at least a fair proportion of it; and you must provide special rooms for cooking and for manual training. And the moment you take up these three items, you are faced at once, if you think, — and you ought to think on all these problems, — you are faced at once with the question, what are those things for, what are they intended to accomplish, and are they accomplishing it; are they arranged and equipped in the best possible way to accomplish what they are intended to do.



BISHOP CHEVERUS SCHOOL, EAST BOSTON

Take the assembly hall first. In nine cases out of ten, the assembly hall is used ten or fifteen minutes a day in the morning. And the rest of the day it may have a little desultory use here and there for a sewing class, or a class in drawing, but for the most part it is an unoccupied room. It is not paying for itself. It is a great big space. It occupies a large number of cubic feet; it has added materially to the cost of the building. It will be your duty when you go out into your profession to consider just such problems as that. If you have to deal with a manufacturer who is putting up a manufacturing plant, and you can design him a good manufacturing

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plant on the old lines, that will do just as well as the old plant would, and will give him a little better construction and a better looking building — you have not begun to do your job. What you ought to be able to do is to give him some better way of planning, giving him better results. You have got to think of what might be called side issues. It is because you have to think all the time of side issues that this profession of yours is so different from other artistic professions. That is why so many men go into architecture and do not succeed in it. Because they have not got the mental equipment back of it all to enable them to use the information and experience they obtain in a school like this.

For that reason, all of us that are interested in the school here think that the men in this department should have their A.B.; because we feel that that is the most important thing that anybody who is going to be an architect can have — a thorough all-round education that will give him mental equipment to enable him to grapple with the kinds of problems that come before him all the time in practice. Some years ago five of us, representing as wide points of view in architecture as could be got together, were asked as the committee on education of the American Institute of Architects to consider certain fundamental questions. These five were Mr. Carrère, Mr. Kendall, Mr. Trowbridge (all men who had been trained on the other side, and had studied and practised for a considerable number of years on this side, whose general trend was towards the scholasticism of the Paris Ecole des Beaux Arts), and Mr. Cram, who is not exactly a Beaux Arts enthusiast, and myself. And we were asked to write a preliminary statement as to what we believed was most essential in the education of an architect and what we believed ought to receive the greatest attention in the schools. All five of us wrote independently what we thought in regard to an architect's education, and then we read at a joint meeting what we had written. Without exception, all five of us said practically the same thing, much to our own surprise. We found that we all believed a well rounded education was the absolute essential, because without that a man was not equipped to do the thinking necessary.

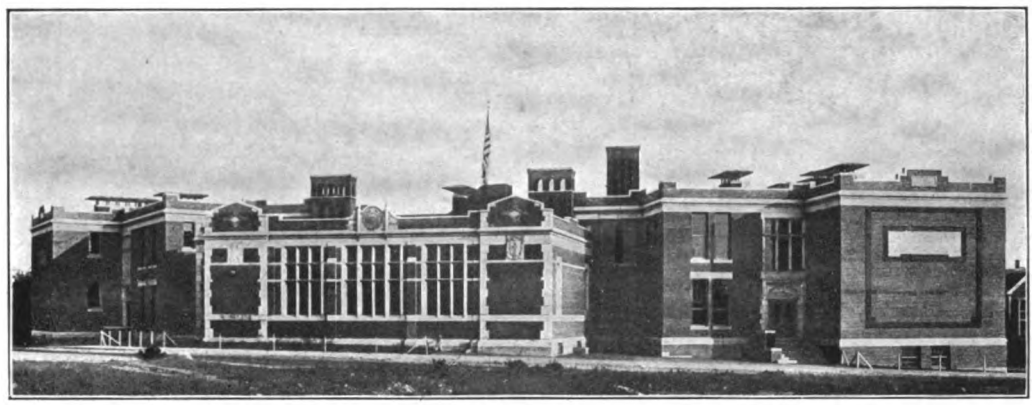
I have had a good many boys go through my office, boys who came up through the ranks, and who perhaps have started in as office boys. Such a boy can learn to draw with perfect readiness, and can go forward very rapidly, and at the age of twenty, he will be a long way ahead of the college graduate. At twenty-five, the two might be neck and neck, but from that time on the man with the education back of him will leave that other man standing still. None of you men want to be left behind in any such way. It is because of this, that all of us who are interested in the school believe that none but college graduates ought to come into this practically graduate school.

Let us return now to our problem, and this extremely hard nut we have to crack of the assembly hall. How can you make that assembly hall really useful ? It ought to serve some better purpose than being used

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fifteen minutes a day. It was left for a teacher to follow up just exactly that trend of thought, but from my point of view it ought to have been an architect. And it will be architects who will take up the thought laid down by that man, and put it into practical working and solve the problem. This man was spurred on by the fact that he had practically four children for every desk he had in the city, and he wondered how he could put four children at one desk. He said, if you will let me use the building for twice as many hours in the course of the day as now, and will give up all idea of personal ownership in the desks eliminating the books from the desk so that no child will own any particular desk, then two or three or four children may occupy that particular desk during one day.

He was asked whether he could find something for the three others to do when one is occupying that desk ? He said of course he could, " I would



BISHOP CHEVERUS SCHOOL, EAST BOSTON
Brainerd and Leeds, Architects

put one to work in a shop," — (he called the manual training room a shop, because the boys were being trained for some use in the world, and he proposed that they should do the repairs about the school). " That will take care of one child. I will have another child out on the playing field, playing games or exercises, but under the supervision of an instructor and as part of the school system. And the fourth, I will have in that assembly hall, where we will have talks illustrated by stereopticon along the line of things they are having in the class room." Just by a turn of the hand he had made one class room serve four classes every day. That is an example of just exactly the sort of thought you must put on every single problem that comes up to you.

Now try your hand, if you will, upon an upper elementary school, and bear in mind you must provide class rooms as before, and that in addition you must provide an assembly hall. And if you will, try to make the assembly hall serve more than one purpose. It will surely have a level floor, and have merely benches in it. It will be a big room with a clean floor for, if raining outside, they could have their athletic exercises in the hall, and it will serve a double purpose there. Besides that, you will have to have your shop and your kitchen. The teacher referred to utilized

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the kitchen to provide the midday meal that was necessary with the school occupied all day. And, of course, as a matter of fact, the girls who had got sufficiently proficient to be real cooks, and get the mid-day meal for the school were really proud of the job, for it meant to them that they had learned something, and having learned it they valued it because they felt they could make some practical use of it.

Of course the upper elementary school will cost much more per pupil than the lower elementary school because you are providing every pupil with a share in space that did not exist in the lower elementary school at all. So you cannot expect the same satisfactory result so far as cost per pupil is concerned. But you will be able to test it in exactly the same way; and find which solution is really an economical one. The moment you tackle a problem of that kind, you must think of all the things that I have briefly run through. You must consider your plan and your section with the heights of the stories and your elevation *at the same time*, and you must consider the problems of heating, of outside light and of artificial light, and of ventilation and of plumbing.

Architecture is a difficult profession primarily because the architect must think in an entirely different way from most people, for in nine cases out of ten, people without any particular architectural training see things in two dimensions, and think in two dimensions. One of the first points you learn here is that you must think in three dimensions at once. You must think of your plan, your section, and your exterior at the same time. It is because you must think of three things at once that your mind gets the training here that enables you to think of a great many more than three things at once. That is what you must do with every architectural problem that comes before you. Now let me show you briefly just what I mean by studying the elevation in connection with the section. The window sill must be down fairly low, about the level of the top of the desks. You must determine first the construction of the floor in order to determine where your ceiling shall be. You must know at once how you are going to take the span. The moment you do that, you are brought up to the question of points of support in that exterior wall, and that brings up the question of distribution of light along that wall. So you have three or four kinds of problems right there in connection with what your outside will look like. You might consider it best to get steel in the outside wall, and have group windows, but then you must figure out whether that is an economical solution. And then consider whether you can take it in the single span with masonry construction; and you may come to the conclusion that it is more economical to divide it into four or five bays. Then you must determine whether it is more economical to put steel in the outside wall or build the walls of masonry, which will depend very largely on how many stories you are going to have, and whether you must build excessively heavy walls for height. You have an awkward situation on the outside, and it is for you to make it look well. You have the problem of a

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great hole in the wall or a series of equally spaced openings, which is unpromising material. And to complicate it, you have a little bit of a unit (the cloakroom) in which you want light also. Not only do you have this series of windows once, but you have it repeated in a number of different places, and also you have large blank walls. You must take these conditions and meet them, and in addition you must make your building look well, that is you must make of it a work of art — a thing of beauty which will express these conditions.

This is the sort of thing you must think of when planning so simple a building as this lower elementary school, made up of nothing except uniform units, and units of the simplest description.

Now just a word or two on what I have already touched upon; upon the study of art, and what it really means for the architect. The point of view of the man who felt that the fine arts were something outside the life of most men, or that they were a dilettante thing, and that no one seriously-minded would care to think about them at all — this point of view is, of course, absolutely false, and absurd as well. Art is the one vital thing: it is the thing that means more in the civilization of the world than everything else put together, and there is no way you men can fulfill your professional life, unless you do make art in all its forms an essential part of your life. You must trace it and see it in every single thing that you do, — in your history courses, in your reading, in your literature, in your music — in all these art must be foremost in your mind the whole time. That is what really counts. You will find as you get older and begin to practise that you get help in your architectural problems from all sorts of unexpected sources.

A couple of summers ago, I was talking with a painter who has been very successful painting on the New England coast. He is a man who paints very rapidly; sees something, gets a vision as it were, and puts it down before the impression is gone, before the light is changed. Sometimes, but rarely, he will have to go back, at the same time of day, and as nearly as possible under the same light, to finish; but as a rule he gets what he wants at one sitting. At the particular time I speak of, he started a sketch, the subject of which seemed simple, and yet it would not come, and he worked on it for a couple of hours, and then the light changed, and it was over for the day with nothing more possible. He got it back to his studio, and still could not make out what was wrong with it. There happened to be a little colony of people on the island and among them some extremely good musicians. One day while listening to the music, he said suddenly, I know what is the matter with that thing; that music puts it in my mind. He went right back to the studio, and corrected what was wrong in his painting in the light of what he had heard in the music. It sounds in a way absurd, yet those of us who practice any fine art get that sort of help all the time unexpectedly from other arts. And you cannot afford to miss any opportunity of getting your minds well rounded, and

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stored with all those things which mean art, — whether it is music or poetry, or painting or sculpture, or your own architecture: or whether it is simply that intense appreciation of outdoors, and all the beauty which lies about us. You cannot afford to let any of it slip, because some day it will be useful; and you can never tell when nor how it will come; but the more you can get of that genuine appreciation of the things that are beautiful, the better architects you will be.

Secondary Schools

We now take up a problem infinitely more complicated than these elementary schools. The moment we go up to the grade of the high school, we are confronted with innumerable educational problems. Fifty years ago, the theory was that practically every boy and girl going to high school went because they expected to go farther, to college or some sort of professional school, after they got through. But it was not really true then, and it is not at all true today. Yet, to a certain extent, we are still planning these secondary schools as if it were true. The high school scholars are expected to have all that was in the elementary schools — the class rooms, their cooking room developed into household science, and the manual training room developed into its various branches, and the assembly hall. Besides that, they must have laboratories and lecture rooms, and a gymnasium with lockers, dressing rooms, and baths in connection therewith. By the time you have equipped the ordinary standard high school with all the things demanded in New England today, and it is more or less true all over the country, you will find that your class rooms are quite the reverse of what they were in the elementary school. In the elementary school, they made up practically the whole building: there was nothing else but corridors and wardrobes to tie them together. In the high school, it is a relatively small area that they occupy.

I have already briefly mentioned the new items needed in this building. I am now going to take up each of those, and review what it is intended to accomplish.

Take the class rooms first: In the lower elementary schools each pupil had his own desk and stayed there all day. In the upper elementary school, it was somewhat the same thing, although at times they were dismissed for outdoor exercises, or for shop work, or cooking lessons. But in the high school the pupils are practically in their own class room very little of the time. They are constantly shifting from one room to another, and consequently they are provided in addition to their class rooms with recitation rooms; for every time a class of forty is dismissed, the pupils are not all going to the same place. Some are going to the chemical laboratory, the number varying, for there is not room there for more than a half division, and not more than half of the forty may be taking chemistry. Others have other recitations. These rooms they go to are recitation

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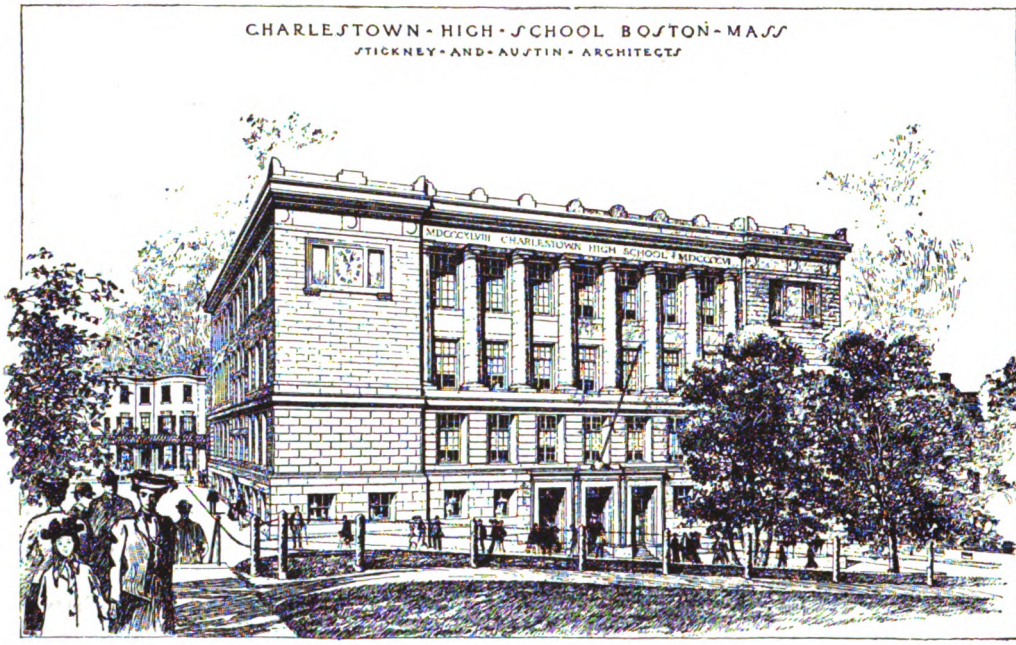
rooms, and are smaller than the room they left, and there will be a remnant of three or four, or six classes studying during this hour. At the very outset, when you have filled up your recitation rooms, you have to a certain extent emptied your class rooms, which are not then being used to their full capacity. The question arises at once: is this class room system, that has come up from the elementary school, right, does it really fit the high school needs where the pupil is moving all the time ?

Take another view of it. In a city of any size, they will want to be able to use these rooms in the evening for night classes — perhaps for older pupils, and for those who are at work during the day, and who can get their additional training only in that way. If you put them at desks already filled with material belonging to others, you are confronted with the problem of their losing or misusing some of the materials left in the desk. The question arises at once whether this is the right principle. There must be some better solution than to build class rooms which seat forty, but which most of the time have no more than twenty in them, and then build other rooms for the twenty that have gone out. We have not yet reached the solution of this, but we must think about it, for that is the kind of problem confronting you as soon as you tackle school-house design.

Another needed addition here is the household science. If you put in the proper equipment, it would mean the installation of a kitchen, and a dining room where they can learn to set a table, a bed room where they can learn to do housework and make beds, and a laundry, where they can learn to wash. This takes considerable equipment, little of which can be put to practical use in school. But why not put a part of this to a practical use in the school ? The cooking might be put to practical use by serving lunch, which is a more or less fixed feature with secondary education where there are two sessions. Many stay in school in the middle of the day, because high schools are not so numerous as elementary schools, and pupils often come from a distance and cannot return home for lunch. The high school of practical arts in Boston has a regular class in cooking that has graduated from the elementary school. The girls working in that class take charge of cooking and serving the lunch, each division taking one day in the week. The class that is to provide the lunch for that day is taken to the market, where they learn how to buy provisions, then they come back and cook the materials, and another division sets the table, and serves the food. Their cooking room is in use every day, and for a good part of the day. They have made that part of the class work absolutely efficient. If they applied exactly the same reasoning to the shop, they would see that the boys working in the shop would graduate from doing little exercises in carpentry, and in the use of tools, into doing things of value about the building itself. There are innumerable petty repairs going on in a large school building all the time, all of which work might perfectly well be executed by boys who had proved themselves fitted to do that work in going through the shop course.

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In the science laboratories you come to a still more difficult problem to handle economically. Boys and girls of high school age, as a rule, do not require any especial training in the sciences unless it can be made definitely applicable to their life and work thereafter, and yet all the high schools in New England are equipped pretty elaborately. Some years ago, I remember asking the late Professor Sanger and Dean Sabine to examine and report on the equipment actually installed in the high schools of Boston for chemistry and physics, and then to report as to what in their judgment was really necessary in the amount of equipment. Professor Sanger made a report the gist of which was that most of the equipment in the high schools was better than what he had for teaching advanced chemistry, and



CHARLESTOWN HIGH SCHOOL, CHARLESTOWN, MASS.

in his judgment it was a waste of money to equip the schools in that way, that much of the equipment was of no particular purpose for anyone except for the teacher of chemistry to use in his own experimentation and research. Dean Sabine's report was practically to the same effect.

If in place of a lot of superfluous equipment in the science laboratories you can get a compact equipment that is definitely correlated to something else in the school; as, for example, if the girls could learn just that amount of chemistry that would be of direct value to them in their cooking, it would be interesting to them, and give them something of definite value in their work; and if the boys could get just that amount of chemistry that would help them in their other work, they would be getting definite results out of it, and it would perhaps be just as well if they did not spend so much of their time over laboratory tables in individual work; for most of the results of such elementary work can be secured from demonstrations and lectures, which yet would prepare them to go farther, if they had any particular bent in that direction.

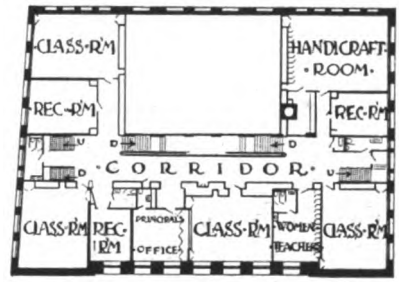
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As to physical exercise. The demand is for a gymnasium, independent of the assembly hall. Here you have two large units neither of which is in full use the full time. Yet I never was able to persuade the authorities in Boston that they could so arrange their daily schedule as to make the assembly hall serve the purposes of the gymnasium, and thus have one space instead of two.

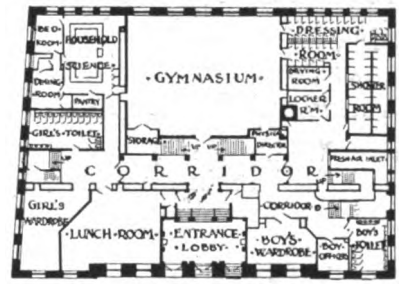
I am going to outline to you very briefly, a typical modern high school of five or six years ago, that embodied all these requirements.

I shall take the Charlestown high school as an example. You will readily see what an extravagant thing it is in the way of equipment for the work that it is intended to do.

It occupies a block that is lighted on four sides. The whole of the center of the building is occupied by the assembly hall and gymnasium, two stories to each. The science laboratories occupy the whole of the fourth floor. The whole of the basement is occupied by lockers and baths and lunch rooms. In the whole building, you had for class rooms only what was left of the first floor after taking out the entrances, and what was left of the second floor, after you had taken out the principal's room, and the teachers' rooms, and a certain portion of the third floor. The building as a whole accommodates five hundred pupils. Whereas the ordinary elementary school of that time cost $140 to $150 per pupil, this building cost about $600 per pupil. That was the price they were paying for the last three or four years of education that was given free in the city of Boston. It was perfectly extravagant. And the place where the architect must step in is to show the others, who do not understand things from the architectural point of view, how a plan can be made comprehensive and the parts correlated and brought together so as to prevent the waste, and reduce it to workable practicable proportions.



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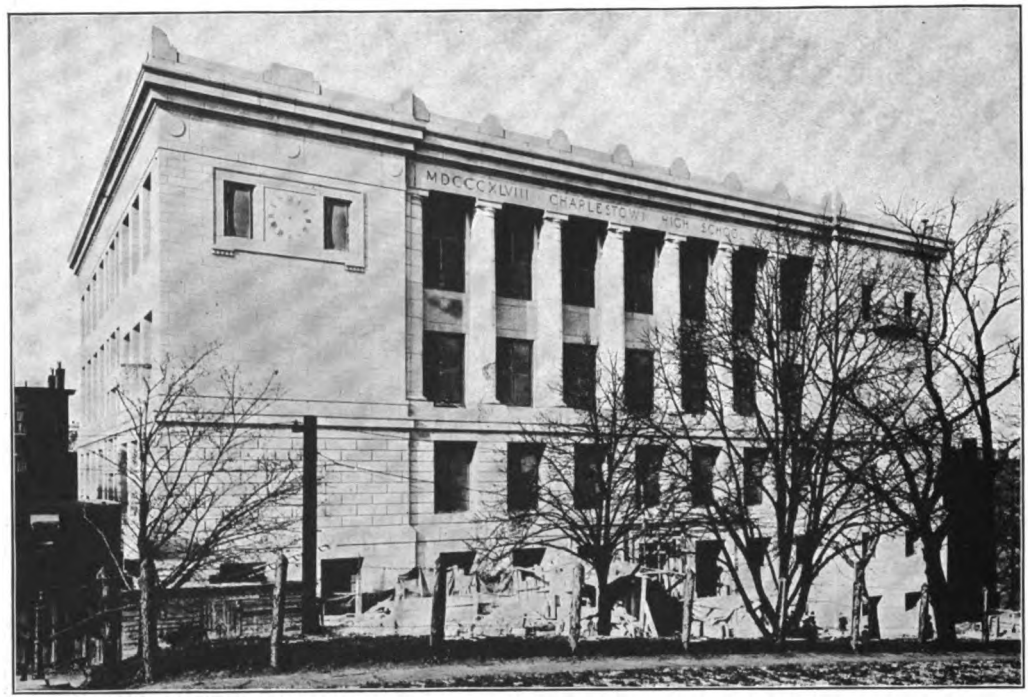
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CHARLESTOWN HIGH SCHOOL

The teachers say they want it; but this often simply means that the teachers do not know how to obtain the result that they have in mind. I well remember, a teacher once said to me, " I want my chemical laboratory 30×40." I asked him what he wanted in it. " That is not so important now," he said, " I will let you know that later. For your purposes, you need only know now the size, and I want that 30×40." I said, " but it is important for me to know what is going into it, I might want to know whether it is to be a corner room with light on both sides." " Yes, yes, I want a corner room lighted on both sides," he said. Then I faced him

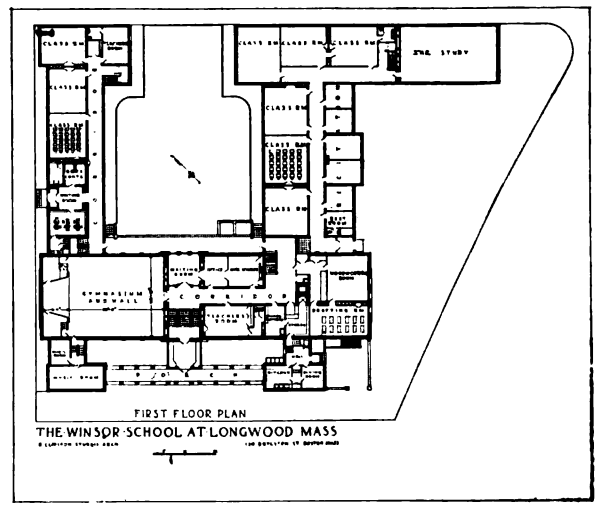
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with other difficulties. I asked him " how do you know you want a room of that size: why not 20×30 ? " His answer was, " Why because there is a



CHARLESTOWN HIGH SCHOOL, CHARLESTOWN, MASS.

room in Bridgewater that is just the room I want, and that room is 30×40." I sent a man down there and found that much of the room was waste space, and much of it was dark. My man went down to the room below, and found that the reason why it was 30×40 was because the room below seated eighty pupils, and it required that sized room to take eighty desks. The Chemical Laboratory was over it, and it was the room below, and not the requirements of the laboratory that determined the size. The outcome of it was that I found that a room 24×36 would give them all the equipment they would want. The moment the equipment was laid out in that room, the teacher of chemistry said it was all right, and gave him all the equipment and space he needed. This is what I mean when I say that you must do the thinking and you must understand the problem and what is to be done with the space before you can plan intelligently.



WINSOR SCHOOL, LONGWOOD, MASS.

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I am going to attempt to review the main points in two school buildings typical of two very different problems. The first is a day school for girls, the second a night school for boys. The problem of the girls' school — the Winsor School in Boston — was as follows. The school covered nine years' study, and was divided into a lower and upper school, the former corresponding to the upper classes of an elementary school, the latter to the classes of a high school. The two were to be kept independent, and the elementary department was to be planned for a few boys as well as girls. The lot was a block open on all sides, and having parks on two sides. The lower school required class rooms; the upper required also recitation rooms, rooms for drawing, carpentry, cooking and science. Both schools were to share in the assembly hall, gymnasium and bathing facilities, and in the



THE WINSOR SCHOOL, LONGWOOD, MASS.
R. C. Sturgis, Architect

lunch room. Outdoor sports, and indoor games were also to be provided for. Here are presented the general school requirement and the special modifications. As the latter are the unusual ones, it is well to consider these first. Two schools combined, independent and yet sharing certain portions of the building. The upper is the larger and requires the more equipment. Place the units used in common, gymnasium, hall, baths and lunch room, between the two schools. As these units are all large ones, let them occupy the full width of building, get light from both sides and utilize them for thoroughfares. Thus we use the sunless exposure for rooms which have a sunny exposure also, and we eliminate corridor space. Next plan the class rooms, the study, the physics laboratory and other rooms where sun is essential for the southeast or southwest exposure, and place corridors, stairs, drawing room, shops and recitation rooms on the less favorable exposures. Then follows the detailed study of compacting

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the plan; making the class and recitation rooms the needful size and no more (here so essential was economy, that the class rooms that contained smaller desks were smaller); combining, as was possible, the assembly hall and gymnasium made one room instead of two; botany, zoölogy, and physics were assigned to one room.

It is needless to go further into detail. You will have grasped the kind of study that is essential, study which rightly pursued makes a good plan: a good plan, seen step by step in three dimensions, giving a good beginning for a well-designed exterior. In this case, the irregular a symmetrical plan is the direct result of the requirement of this school as developed on this lot. This, of course, is not saying that this is the only solution, but that a study of the requirements and of the site was the keynote of the composition.

This plan is not given as a solution of the economical housing of pupils in a secondary school; it is not that. The duplication of units which serve the same purpose at different times, and which are not in use all the time, — class rooms, study, recitation rooms,— is not " efficiency." The example is given merely to explain the method of study.

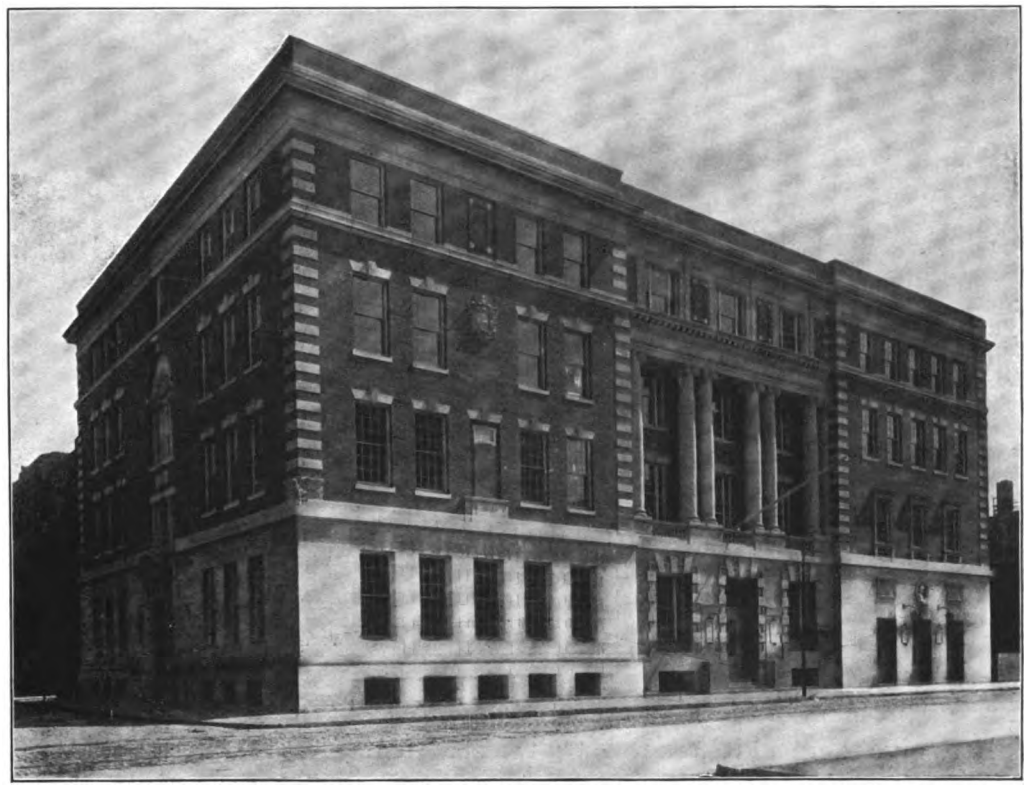
Now we have the other school, also in Boston, the Franklin Union. This is an evening school for men already engaged in various trades, whose free time is the evening. The lot is a city block with light on three sides; the requirements: various class and recitation rooms, shops and laboratories, and a hall to seat 1000. The plan solved itself on account of the lot. The hall must occupy the space on the unlighted side, run through (with its stage) the full depth of lot, have light front and back, and in the center on top, this latter provision making a large light-well on the floors above the hall. Shops for heavy work requiring machinery would be located in the basement, and here boiler room and engine room would be made available for instruction. The big entrance lobby leading to the center of the first floor provided an exhibition hall for various purposes connected with the school, and having light back and front, is fairly well lighted even by day. This, compared with the Winsor School, was a simple straight-forward problem and, after the plans were decided, resolved itself largely into a study of economical construction, permanent and durable finish.

The series of paintings in the lobby are well worth a visit. In ten frames they represent the important events in Franklin's life. His early life in Boston, selling broad sheets on King Street (Washington); his apprenticeship in Philadelphia; his work for science; for the establishment of free libraries; the protest before Parliament; the signing of the Declaration; the treaty with France; and his return to Philadelphia. This is the frosting on the cake, one of the final touches that brightens otherwise dull work. The practical problem is nevertheless the real one. It is a good cake that is worthy of frosting.

It matters little what the problem is to be solved, the essential thing is to know how to go to work to find the solution. When I was Chairman

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of the Board of Schoolhouse Commissioners, I considered it a matter of indifference whether an architect who wished to be considered had had experience in schools or not. If an architect has planned and built successful apartment houses, he has sufficiently proved his ability to solve problems. A considerable experience in a particular class of work is often a disadvantage, as the architect's frequent solutions of other problems of the same class may interfere with his keeping an open mind for the variants. When Boston was building its first open-air hospital for tuberculosis, the physician in charge asked my advice as to architects. I named some who had had experience in such work, and later the Doctor said he had talked with one firm, who had a long list of hospitals built by them to refer to, and



FRANKLIN UNION, BOSTON
R. C. Sturgis, Architect

said he could not work with these men, for they knew more about this new and untried medical problem than he did, and he wanted some one who did not pretend to know it all, but was willing to be a patient student with him. And he was right: he had a special problem, and a man unincumbered with fixed ideas and able to think straight was much more apt to give him what he wanted, and what his special problem required. I do not say it is not of some advantage to you to have solved one particular problem; but do not run away with the idea that the next one of the same sort that comes along is to be solved in the same way. It is very rarely you get two problems alike. Even two school buildings of the same description are affected by local conditions. And when you get up to secondary schools,

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the problem is affected by all sorts of conditions; conditions that are as totally different as if two entirely distinct problems. A high school in Beverly near the United Shoe Machinery Company will be filled mostly with children of the operatives: that has a perfectly definite problem all its own. For children of that type, you have a special problem that belongs to the locality, because there are not ten per cent of these children that are going through with the idea of going to college. Most of them are going to get all their school education right there. When they stop, they will branch into a great many different kinds of occupations, and the school must be adapted to those occupations, and those occupations will depend more or less on the locality. They will be distinctly marked in one town from those in the town next to it. There must be a special study made of the peculiarities of that particular town.

The Boarding School [1]

We found that whereas we could build elementary schools for $140 per pupil, the moment we began to build for secondary education, on account of added features which do not increase the number of pupils that can be accommodated and consequently increase the cost per pupil, that cost ran up to the neighborhood of $500 per pupil; and in my judgment that is altogether too much.

I did not attempt to tell you what the answer to the problem was; partly because I did not know, and partly because I want you to feel, in studying problems of that sort, that the solution is not going to be made for you, but that you have got to make those solutions for yourself, and that the only way for you to arrive finally is to study the individual problem, and make yourself acquainted by personal inquiry with what the conditions and necessities of the case are. I tried more particularly to point out the lines along which you should think. That if, for instance, it was a problem of teaching the child how to cook, that you should try not only to give them a kitchen to learn that particular lesson, but should try to arrange it and correlate it with the other work of the school, so that it would lead to some practical, efficient result in the way of education — so that you could assure yourself that the amount of money that was spent for that particular purpose was producing the required effect.

Today, we are going to move on to a problem of education that is still more complicated, because we are going to take up the housing and the feeding of pupils as well. I am going to start with an examination of one way in which children may be housed, and compare that example with another similar one and see what is to be said in favor of the one system or the other. I am going to take, for example, first the housing of boys in a boarding school. We will take what is generally accepted to be the cheapest way, I do not say it is the most economical, of giving those boys a

[1] Lecture given at The Perkins Institute for the Blind.

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place to sleep, a dormitory like a hospital ward, with no partitions at all in it, one big room. At first sight it would seem that there could not be any question but what that was the cheapest way to put the boys to bed.

Now I am going to give you a parallel from a different kind of problem. It is generally supposed, in a museum of the fine arts, that the top-lit picture gallery is of course the most efficient way of hanging pictures. For the top-lit picture gallery gives all four walls on which to hang your pictures: it seems like a self-evident proposition that if you have to put windows in one wall, you cut out one wall on which to hang pictures. If, however, you think in three dimensions and consider the section of your picture gallery, you will find that in a room of low stud, you will get reflections and glare on the walls. It is generally accepted, that the picture gallery should have considerable height, with the ceiling opening as narrow as is consistent with getting the light that is necessary. The cove is introduced, because you get a certain amount of reflected light which is valuable in giving distribution of the light. But even then, the effective portion within which you can hang pictures is ten to fourteen feet high; above that you will get reflection and the only way to avoid it is to tilt the pictures. With the height that would be necessary in a room of 35′ in width, you can readily see that if you put a floor through just above the effective portion for picture hanging, that you thereby double the floor area, and if you turned that into a room, you would get two or three times the amount of wall space that was available for pictures before, and this although you had to put windows in each end of these two rooms to light them; for you might say, you can't get light down a room 35′ long. All this only shows that it is not so easy as it sounds to prove that the top-lit gallery is the most economical.

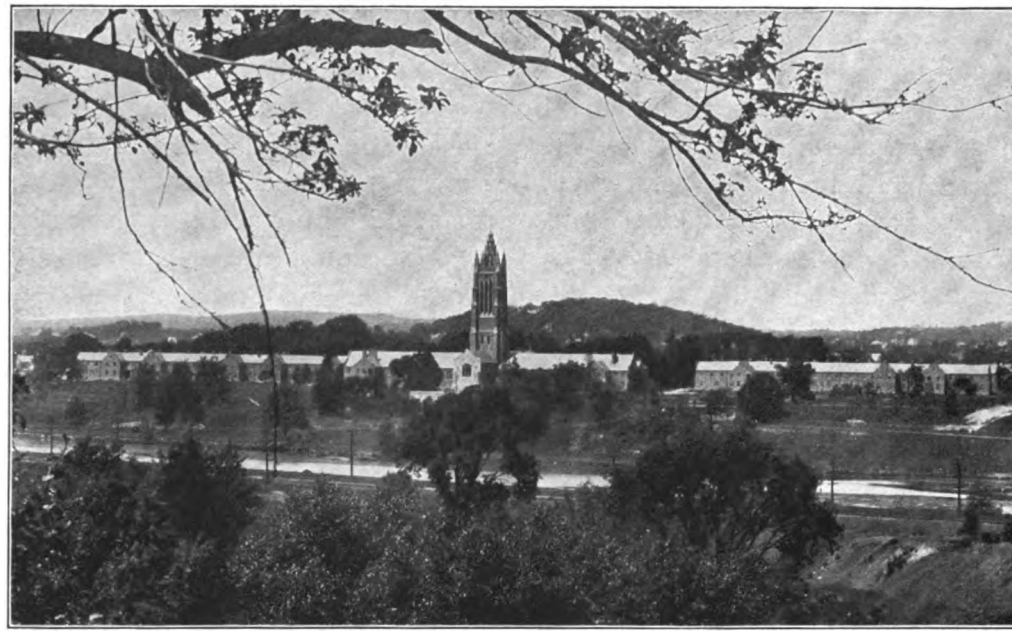
Similarly it is not so easy as it sounds to prove that the dormitory with a lot of beds in it is the most economical way of taking care of children. If you are going to have a dormitory with a lot of boys in it, you must have a very high room; and the chances are that you will have a room that is high enough to enable you to put a floor through it, and make into two stories. The floor, of course, adds to the cost, but you double the area. Divide the two floors into rooms and on these two floors, you will not accommodate double the number of the original open dormitory, but you may get one and a half as many boys in single or double rooms, each lighted from the outside, and the accommodation is far better, and may not be proportionately more expensive. I do not say it will be as cheap, but it is open to argument that it may be as cheap. You cannot say as an axiom that that big dormitory is the cheapest way to house boys in a boarding school. You can prove it by figures, because you can take the actual space and divide it up and find out. That is exactly the sort of study that I wanted you to do with your elementary school when I told you it was a plain mathematical problem. I wanted you to see who could make the best six to ten room school building. Because when you have

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your studies finished, you can compare them together and measure them, and see which has got everything necessary into the smallest cube, the most compact area — the one who has solved the puzzle.

So the moment you tackle a problem like this, it is first a question as to what is the best and most economical way of housing the boys and giving them bed room.

We will take up now the housing of the boys all in individual rooms. You can perfectly easily plan what is the smallest limit that will serve for a bedroom, for a boy who is going to occupy it simply to sleep in. It is not his living room, it is not his study room, it is not his wash room, it is simply a place for him to sleep. You have your definite unit of the bed and whatever furniture will go with the system employed in the school where he is. If his clothes are kept in his own room, you will have to choose the accom-



PERKINS INSTITUTION, WATERTOWN, MASS.
R. C. Sturgis, Architect

modation necessary for that. If there is a place to dispose of his trunks elsewhere, you will not have that to consider, and can get your definite low limit of accommodation. You might find that there is a more economical way of housing the boys than that, as by building a room slightly larger and putting two beds in it, or you may find that it will work out to better advantage to make the room a little bit larger and put four beds in it, but you will soon come to a point where you cross the line between the dormitory that requires extreme height in order to give plenty of light and air, and the little room which requires a very small window, and a very low stud and yet is perfectly satisfactory.

That is just the fringe of the problem when it comes to this problem of the boarding school. The bedroom is just one small item. You must know what is the principle that is going to govern the boys in their living.

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Besides sleeping, they have got to eat. So that the first question, after the question of the bedroom, which you will solve in the light of the particular problem, whatever it happens to be, and will reach your solution with single or double bed rooms or dormitories, will be the question as to how the children are going to be fed in the given school. Here again, the first idea would naturally be a central dining room for the whole school, because that will mean not only a single room, which perhaps would be open to proof as to whether it was the most economical way of seating them at the table, but it would also mean a single kitchen, a single serving plant. On the other hand, you would necessarily have, as an argument against that, the difficulty of handling boys in large crowds. Whether you are going to get the efficient result that you want to get, if you take a school of 150 or 200 or 300, and try to feed them all in a single big dining room, will bring into the consideration the question of administration and teaching, into which perforce you have got to enter. You must know what is to be accomplished, if you are to solve the problem.

So you would have to take up the work in the light, not only of an architectural problem, but as a sociological problem, as to whether it is desirable to have the boys in big groups or small groups. And, of course, to a certain extent, you are trenching on the field of another profession. And if there is one thing you have got to keep in mind always in your profession it is, that with the inquiring mind must go the humble spirit, because if you are going to solve the problems you must understand them in the first place, and know what the problem is. You must ask questions, and you must ask them with an open mind, a mind that is ready to see the different points of view. Unless you can see those, you cannot see around a subject and reach its proper solution.

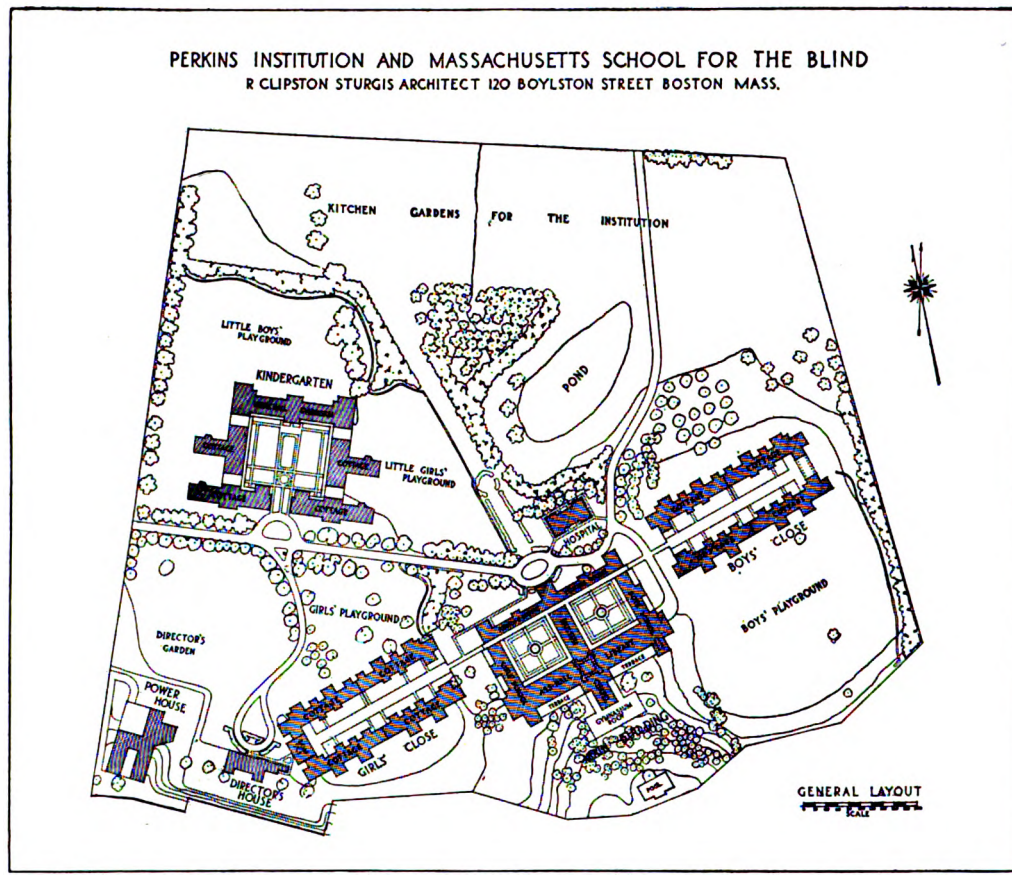
So with this larger problem of the boarding school, you have every single one of the problems that you had in the ordinary high school, the secondary school, complicated by all the problems of daily life. You have the feeding of the boys, and the sleeping of the boys, and the care of the boys during the waking hours when they are not in school. And that means not only the care of them in the house itself, but the care of them on the playing fields as well. So that you have got a problem which ramifies in every direction and touches on innumerable problems that are not architectural problems at all.

I asked you to come out here to the Perkins Institute because here was a particular problem with one solution, not necessarily the best solution even for this problem, but a solution that was arrived at after pretty careful study of what the requirements were. In this instance, we had two large groups, each of which was subdivided again; we had the group of the children who belonged here in this upper school,[1] and the group of children belonging to the Kindergarten or the lower school — not a Kindergarten in the strict sense, because the children there are from six to eleven years of

[1] The talk was given in the main building.

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age. And each of these groups was separated into boys and girls. The problem of a mixed school was quite different from what it is in ordinary public schools, because these children go all the way through from the lower grades to the upper grades, and when they leave they are comparatively mature, from eighteen to twenty years old. While the separation of the sexes might be argued about one way or the other with normal people, with the blind it is very desirable that the sexes should be kept entirely separate. For while there is no particular reason why a blind person should not marry a seeing person, it would be most unfortunate for a blind person to marry another blind person. As the separation of the



sexes is therefore absolutely essential in the upper school, it is desirable in a way in the lower school so as to lead up to it. So we had a problem of the entire separation of the two sexes, in each one of the two schools, but much more marked in the upper than in the lower.

The next special problem was laid down for me by the authorities, which was to house them in independent families of comparatively small numbers. That meant that every child was to be the member of a household, that he might get that sort of personal touch in the home life, that is particularly essential for a child that is not normal. So that we were trying to solve the problem of housing these children in groups (in this

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particular case in groups of twenty) and yet to do it in a way that was not extravagant, because we could not do it extravagantly even if we had wanted to, for there was not the money available to do it; and apart from that, I think it extremely bad policy, under any circumstances, to do any piece of work of this kind, whether public or private, in a way that sets a false standard. I do not believe it is the right thing, when a very rich man gives to his little country town a high school that could not by any chance be duplicated for any other such town, and which sets for those children an altogether false standard of what a high school ought to be. That is the sort of thing that every one of you, in practice, will have to stand up against at times. For this country is unfortunately filled with people who have acquired wealth rapidly and who do not understand its value, and whose one idea of worth is that of things which cost lots of money, — an entirely false standard, and it is particularly false in any undertaking of this sort.

So from any point of view, we were bound to get this problem down to the most economical figure. It had to be economical not only from the point of view of first construction, but economical from the point of view of administration, which is quite as important, because with a limited income the buildings must be arranged so that they can be administered economically. There had been a good many examples from which one could draw in order to find out what an economical elementary school ought to be. There were a good many things that at least cleared the way with the high schools, but until one began to look into it, it was extraordinary, that there were so few examples that would give the sort of information that would establish what ought to be the cost per pupil for housing the child. There ought to be, because it is exactly the same mathematical kind of a problem, as I said at the outset, as that of the bedroom. The space required for whatever the child has in it can be definitely determined. You know exactly how those units can be placed together in the most economical way. You know how much corridor is necessary to serve them, how many stairways are needed, and how big your dining room will have to be to seat the household, and what the size of the kitchen and serving room must be to take care of them. Yet I could not find any case giving an answer as to what the cost per pupil of a dormitory building ought to be. I took two dormitory buildings in one of our big older boarding schools. In one the pupils had been housed in a building built twenty-five years ago, not very well built, of second class construction, the boys in groups of thirty in dormitories, with the poorest kind of washing accommodations, and it cost only a thousand dollars per pupil, and contained class rooms as well. At the same school, there was a building that had been built within ten years, where the pupils had been housed at the extremely unreasonable figure of $4000 per pupil, with no class rooms; and the trustees, at the time when the building was built, had faintly wondered why the cost was so much, have been very much troubled

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by the cost of maintaining that building, and I do not think it had ever occurred to any one of them, when the building was being studied to see that it was economically planned. That building cost two or three times as much as it ought to have cost, for a half dozen different reasons. It had perhaps, twice as much corridor space as was necessary to serve the rooms that it contained. The rooms were badly related to each other, so that they were not compactly placed on the plan. The plan as a whole was unstudied, the section was unstudied. There were unnecessary heights. The materials of construction were unstudied. Although, inside, the building was finished with expensive white oak, the construction was second class construction. The floors and partitions were framed of wood. The upper floors were expensive narrow quartered oak. The building was of semi-Gothic style and executed with cut stone, which was all hand-tooled; all the tracery in the big dining room was hand-tooled.

Then I took three other boarding schools in Mass., and found that the dormitory buildings varied in the same school, and with the same accommodation under exactly the same conditions from $1600 per pupil, which was the lowest, to $2200 per pupil. There were two buildings side by side, each accommodating twenty pupils, one at $1600 and the other at $2200 per pupil. There was no reason for this, except that the more expensive had a good many piazzas, open porches, elaborate woodwork on the outside, a good deal of elaborate finishing and carving, and mantel pieces inside — things that were pretty but not serviceable and possibly were not worth what they cost. It was a perfectly simple thing to test, of the general sort of problem that we had in hand there. I did not have very much information to go on with these other buildings, they were all of second class construction, that is the floors and partitions were of wood. We took then a theoretical plan and made a group of two or three or four rooms and used the necessary amount of corridor and stair space, and put them into a unit of three stories and saw what that cube amounted to, and what it ought to cost per cubic foot to complete, and arrived in that way theoretically at the answer to the problem.

Suppose you took for an example one of the standard old type solutions to the problem, found in Holworthy Hall at Harvard, a system that has not been bettered very much even after a good many years of study of the problem. When you think of it, that particular solution was a very simple one. You had a square block and one little piece of that square block contained an entrance, a corridor that amounted to nothing except a space between the two doors, and a staircase, — all the rest was available space for all the men on that floor of that entry. They entered their studies on either side, and off the studies they had their two bedrooms. That is all they had in my day in Cambridge. Later the college took exactly that same space, and by a little clever rebuilding and by reducing the size of the bedrooms, without materially injuring them as a place to sleep, they won enough space back of the stairway to put in the necessary

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bath accommodations to serve men on the that floor. There you have one perfectly simple answer to the problem — one staircase, hardly any corridor, and all the rest of the space available.

Suppose, however, that the college had said, " we cannot afford to give two men a couple of bedrooms and a study, and a bath room, to be shared



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in common with the four; we must have, in that same space where you have three rooms (a study — two bedrooms) four bedrooms; we will not have any study;" then your Holworthy system does not work any longer, because you could not get into those four rooms from that one entry. Now suppose you took just this problem; how can you make a flexible unit out

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of the Holworthy plan, and with the slightest possible change, adapt it either to two bedrooms and a study, or three, or four bedrooms on each side of the central unit where the stairs are. A very prettily compact, simple little problem. Then you run up against a law that there must be at the least two means of exit; and that will knock your Holworthy entry scheme into a cocked hat, or necessitate a fire-escape. If your building is fire proof, the law designed to fit conditions of non-fireproof construction is not truly applicable, but still the problem must be faced, the law is there; you will say of course we cannot afford in that one entry to put two staircases, we would soon run the plan into a cube that would be prohibitive. So at once, by what might be considered a foolish law, you have a new element in your problem. You must find some other solution.

Of course the Holworthy solution is not the only one of providing bedrooms. You may provide them opening off a common corridor, and then your problem will be to see how little corridor you can make serve for the largest possible number of rooms, and arrange it so that the corridor serves your bedrooms and the staircases at different ends. In that case, you may find it will be more economical to make one common bathroom that will serve the eight or ten rooms in that section on that one floor.

I found when I made my tentative block plan and took off my figures to see theoretically what it ought to cost, taking a price of about 22 to 24 cents per cubic foot, that I ought to be able to get the cost down to $1600 per pupil, and give them a fireproof well finished and well equipped building. That is only a theoretical figure, and perhaps it might be bettered.

The problem as it faced us here was the individual household problem. It was pointed out to me at the outset that most of the pupils in the upper school could best be taken care of by putting them into double rooms. So we laid out a bedroom that was wide enough to take a bed on either side of a window and that practically fixed the width of the room. We made the room long enough to take the length of the bed, and leave enough space beyond to place two bureaus, one for each pupil, and for every room we tried to provide two closets. That was all that was necessary because there was no washing in the bedrooms. There were some bedrooms that accommodated more and some few that were only single bedrooms. That was our first requirement. I tried to put all bedrooms on the south side, feeling that it was very important that the children should have plenty of sunshine in the morning anyway. Then on the opposite side, we put all the things that did not particularly need the sun, the corridors, the bathrooms, and staircases.

When it came to the question of the bathrooms, it was, as it always is, a special problem. Something different here from what it was anywhere else, something that requires your understanding of what the problem is, something that demands patience to try and find out what the right answer is. In this case we were told that the boys would go in groups of five in the morning to wash, that each boy would take with him his toilet things, and

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go to the bathroom and have just so many minutes before the next squad of five should come. It was essential, then that they should have five wash basins, but not necessarily five anything else. A single tub or shower would serve. It depends in each case upon the administration of the school what that equipment must be. In this case, it was fitted for that particular service. In an ordinary boarding school, they would not go in groups of five, but would go altogether, and in that case you would have to take care of the washing arrangements for practically all of them. And then if you said to the trustees or building committee, " Here is a building that accommodates thirty boys, and in order to enable them all to wash at the same five minutes in the morning, we must put in thirty basins: cannot you change your system slightly so that the boys will get out in squads of fifteen and we will put in only fifteen basins ? We shall save not only in fixtures, but in space. Or go a step further and divide them into squads of ten or five." That is what the owner has a right to look to you architects for. To the head-master, the solution of having the boys all wash at once may seem the only one. They must have thirty spaces for their toilet articles in the wash-room, he says, so why not give them thirty basins ? But they need not keep their things there. And if they are going to keep their things in the wash-room, give them thirty spaces, but do not set apart to the individual use of one boy a basin that might just as well be used by four boys as one.

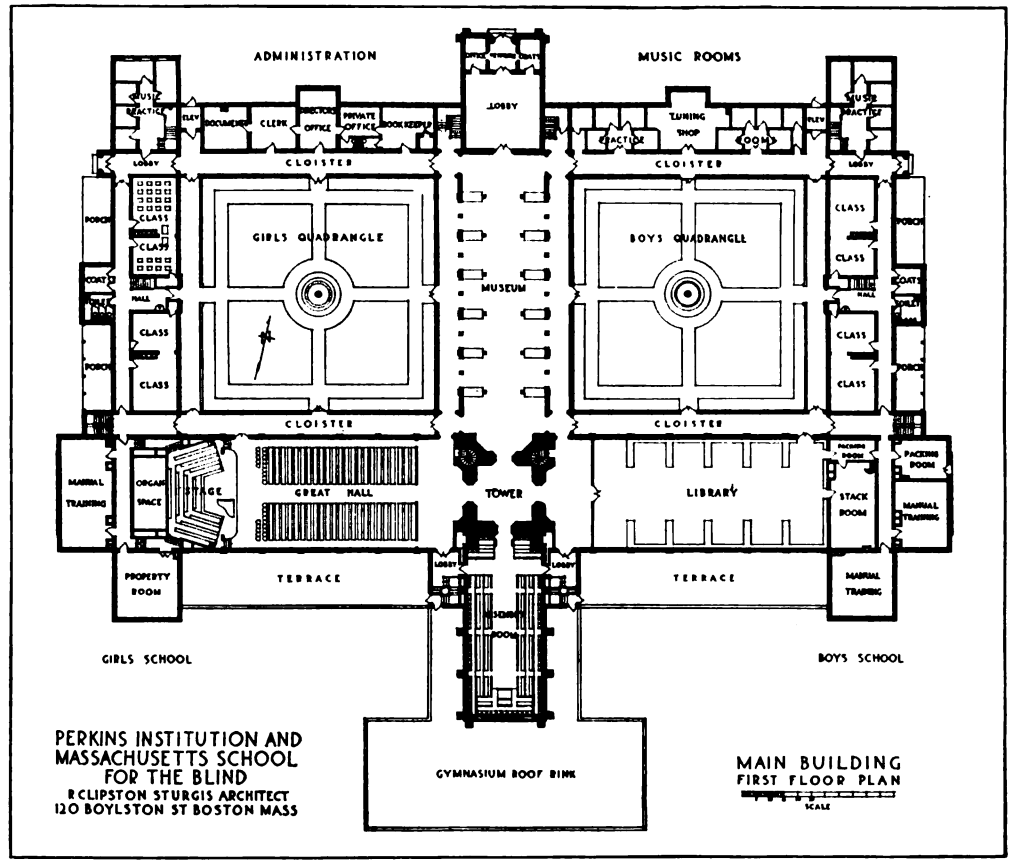
That runs through almost every problem you take up. You must study it in the light of what the requirements are, after you are sure you understand them, and then see if you can reach a better solution than has been reached in the past. If you can, you have made a big step. You have done a thing worth doing, which brings personal satisfaction.

Having got that laid down as the problem of the building upstairs, it came then to the problem of handling the children downstairs. It meant a dining-room that would serve them as compactly as possible. I developed the second floor plan first, because I felt that was the problem we could not change very much. Then the problem was to fit the first floor plan under the second floor plan, to meet the special problems of the children. This meant, as always in architecture, a certain amount of compromise here and there to bring the two into harmony. The matter proved pretty simple here, because the arrangements of the room upstairs, and the necessity of having every part well lighted meant an irregular outline, and that meant irregular spaces downstairs, which were admirably suited to just what they wanted. For although they wanted a big room to take care of their children when indoors, and a room that could easily be taken care of by one teacher, yet it was quite desirable that there should be a sense of subdivision in the room: that is, if the room was irregular, with a space here more or less cut off around the fireplace, and another cut off by a big bay window, where small groups could get together, then that was an advantage. The dining-room, however, was almost essentially an unbroken space. The

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problem of arranging the space on the first floor to correspond with that on the second was comparatively simple.

Then we developed gradually the grouping together of the cottages. We had to face a problem of whether we would build absolutely independent buildings that did not touch each other at all, or buildings that were in contact at points. And my own feeling about it was, that if they were in contact and we could form them into what in England they call a close, we would get a little more sense of intimacy and seclusion (which in a big country place like this was rather desirable), than if we had independent



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houses standing alone. So we decided to adopt the scheme of having our houses on either side of a long central walk, and then we forced the perspective to amuse ourselves. Of course, all along the line the architect gets a good deal of amusement out of almost any problem. In that way the housing of the pupils was developed. And I believe that as a matter of fact, in this group of buildings here, it worked out in the neighborhood of our theoretically established price per pupil of $1600. Now that this investigation has been started, I have people all over the country interested in the case; as state normal schools have to face the very same problem, and many of the trustees of the boarding schools are interested. They will want to know the cost the next time they put up a new dormitory. In

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a few years, then, the architect putting up a $4000 per pupil proposition will probably be asked some questions about it, before he will be allowed to go on.

I have covered very briefly and in a very fragmentary way, the kinds of problems that are involved in schoolhouse construction, from the elementary up to the secondary school and the housing problem as well. And it is not a very long step from that to the planning and building of university buildings, which, however, involve still more complicated but extremely interesting problems, which ought to be followed up on the same fundamental principles. They are very much in line with these problems of the school. They are full of extremely interesting questions, and where so many are capable of a definite mathematical proof, it is very interesting to follow them up on that line, and see how good an answer you can get. I hope some of you will feel inclined to try and see what you can do with a four or six room elementary school, or a ten to twelve room upper elementary school, or a high school that will accommodate a thousand pupils, or a dormitory building that will accommodate forty boys at a boarding school. If you arrive at a compact solution you will be very pleased with yourself.

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FOUR TUSCAN GARDEN THEATRES

BY RHODES ROBERTSON, A.B., M. ARCH.
ROBINSON TRAVELLING FELLOW, 1912–14

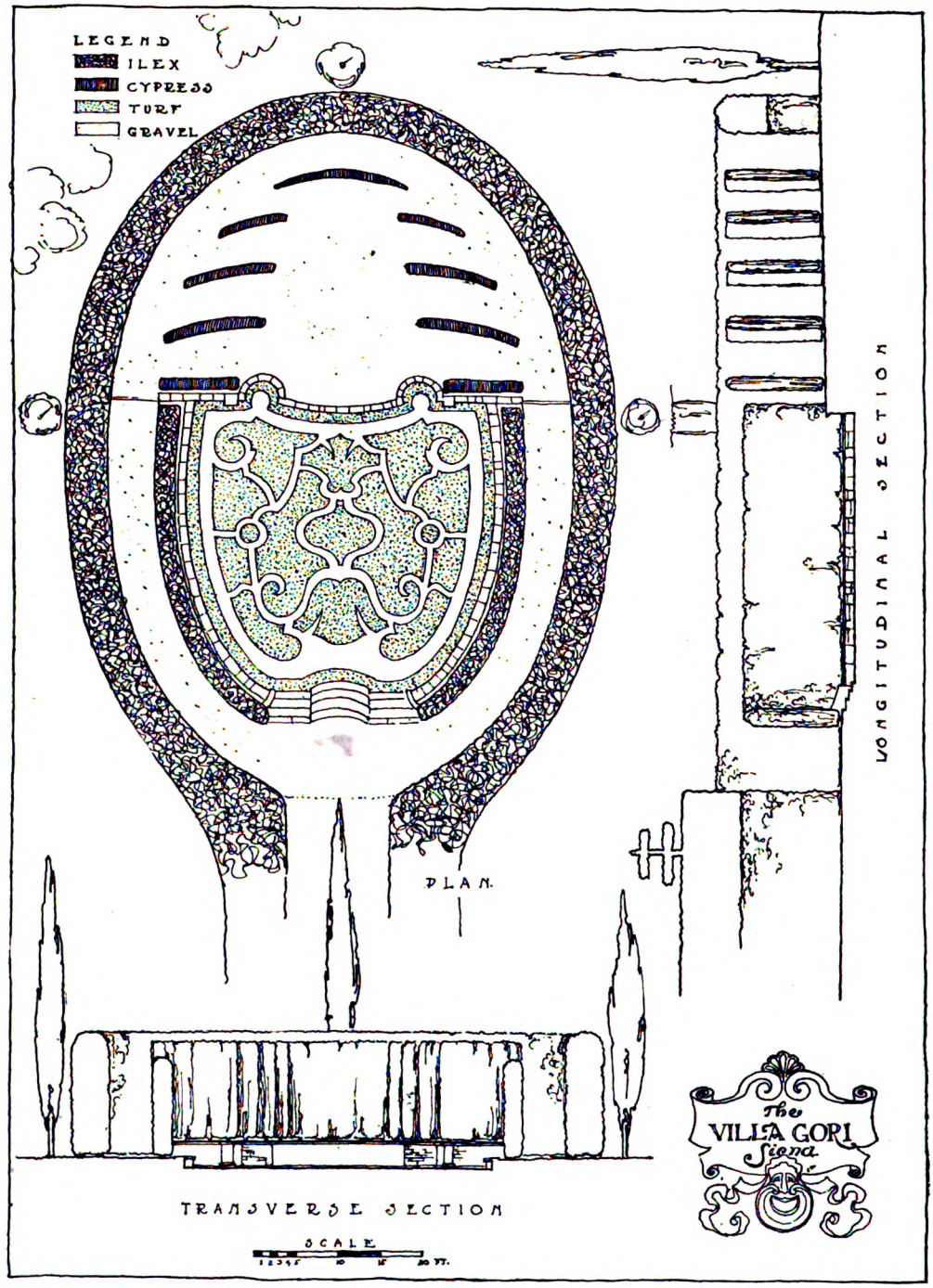
AN interesting feature of several gardens in Tuscany is the out-of-door theatre, consisting of a level space for the audience and a raised stage, with hedges of cypress, ilex, or yew forming wings. The whole is generally enclosed by a high hedge, so that it forms a separate unit and is placed at the end of an axis. These theatres seem to belong particularly to Tuscany — at least the four which form the subject of this paper are in that region. Three of them — in the Villas Gori, Serraglio, and Sergardi — are in the environs of Siena and the fourth in the Villa of Marlia, near Lucca. No others are known in Italy, either near Rome or in Lombardy; but there is a large one near Palermo with cypress hedges and an elaborate "back-drop" of stucco architecture. In the Roman villas water plays the most important part and its abundance makes possible a great variety of effect. It may be that the lack of an abundant water supply made the Tuscan garden architects turn to other means for their effects. This is especially true of the Sienese gardens. They lack entirely the fountains and rushing water which are nearly the whole charm of the villas Lante and d'Este.

The theatres belong in general to the seventeenth century when people were more intent on a garden full of fantasies and surprises than a well planned and consistent whole. So here, in place of water-organs, miniature cities, and grottoes, one finds imitation play-houses fashioned out of greenery with wings and back-drop and prompter's hood. The nature of the problem does not lend itself to baroque architectural enormities, and the harmony of green turf and hedges and gravel paths produces a charming effect. These Tuscan gardens are not elaborate and the theatre is generally the chief point of interest. The stage, already set, strikes one's imagination forcibly as it appears at the end of a vista, and the possibilities of a representation against such a background seem manifold.

Of the four examples that of the Villa Gori is the best known and also the most successful. The villa lies on a ridge about twenty minutes, walk from Siena outside the Porta Ovile. One gets a lovely view of the city from it, but the garden makes nothing of such possibilities and consists only of two long, pleached ilex alleys — one on the main axis of the villa

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and the other at right angles to it leading from the side of the forecourt. The first alley leads to a circular arrangement of hedges and shrubbery which is a well preserved example of Tuscan bird-trap, while the other



leads directly to the theatre. The latter alley paced some three hundred and fifty feet long and is twelve feet wide. At the end one comes out again to the open, while the hedge divides and runs completely around the theatre at a height of fifteen feet. Four steps lead down to the parterre

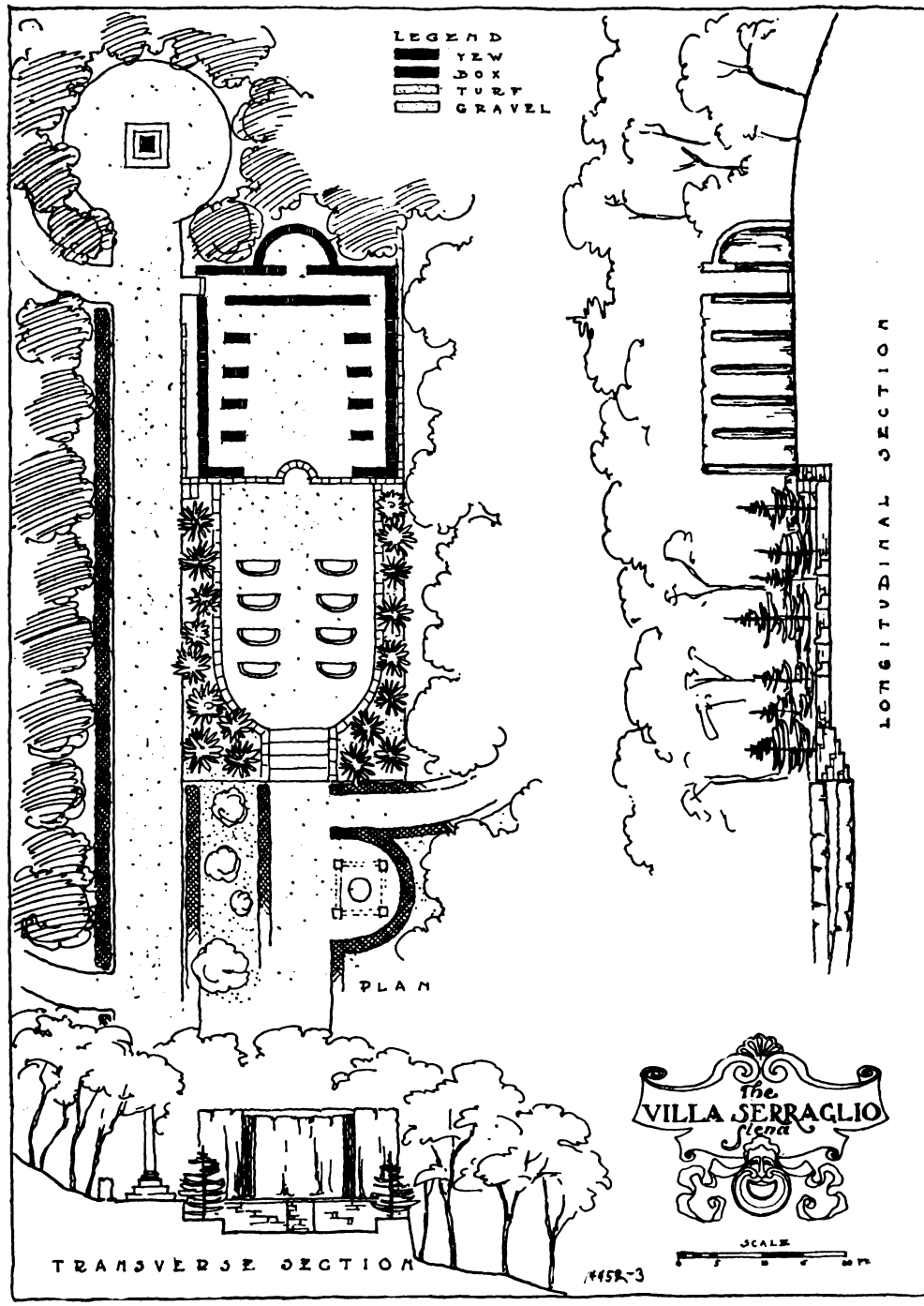
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(or rather "parquet" or "pit" would be the proper term for a theatre), which is enclosed on the sides by a smaller ilex hedge. A stone seat runs along below this hedge, while the central part of the pit is laid out in a charming pattern of "broderie" in turf and gravel walks a foot wide. One does not like to imagine that space occupied by stiff rows of seats in anticipation of a performance. Perhaps the audiences were never sufficiently numerous to make it necessary. The plan of the whole is an oval, of which about half is taken up by the stage, which is raised three feet above the level of the pit. Its floor slopes very slightly up toward the back. The front wall of the stage is curved in a charming baroque fashion and is flanked on either side by cypress hedges which must be considered as forming the sides of an imaginary proscenium arch. Back of these there are three wings and a "back-drop" of cypress hedge twelve feet high. There is a communication completely around the theatre, and the outer ilex hedge is pierced in several places to admit of freer entrance and exit. The soft green of the cypress makes an excellent background, which seems continuous for one cannot distinguish the wings unless the sun casts a shadow from one upon the next. The crowning glory of the Villa Gori theatre is undoubtedly the three cypresses which are planted — one directly on the main axis back of the stage and one at either side on the line of the front of the stage. They are very thin and give a curious effect in their contradiction of the low and monotonous lines of the hedges. Outside the ilex hedge are only ploughed fields and orchards, so it is best to retrace one's steps up the long alley — through the opening of which, turning back, one sees the sunlit stage and soft green of the hedges.

In the same direction from Siena but farther out is the Villa Serraglio. It too lies on the top of a ridge, but one no longer gets a view of the city. The L-shaped house and terrace complete a rectangle from which a long avenue of cypresses continues along the ridge to a monument of most regrettable nineteenth century taste in honor of some famous member of the family. From this point one descends the wooded hillside by winding paths, meeting at every turn inventions and surprises appropriate to the rustic and informal style of gardening. There are a summer house of bark with a thatched roof, an imitation Etruscan tomb, serpentine lakes with Japanese bridges, broken columns with inscriptions, and other fantasies. Among these is a small theatre with yew hedges. It is about half the size of the Villa Gori theatre and might almost have been intended as a play theatre for children, but the gardener said that in years gone by plays had often been given there. The plan is severely utilitarian and has none of the baroque quality of the Villa Gori. One ascends five steps to the "pit" from a curving path with low hedges. The floor is of gravel with eight stone seats arranged two by two, now quite overgrown with ivy. The stage is four feet above the parquet level, and in the middle of the front wall is a semicircular recess for the inevitable prompter. The stage is rectangular in plan and is completely enclosed on the sides and

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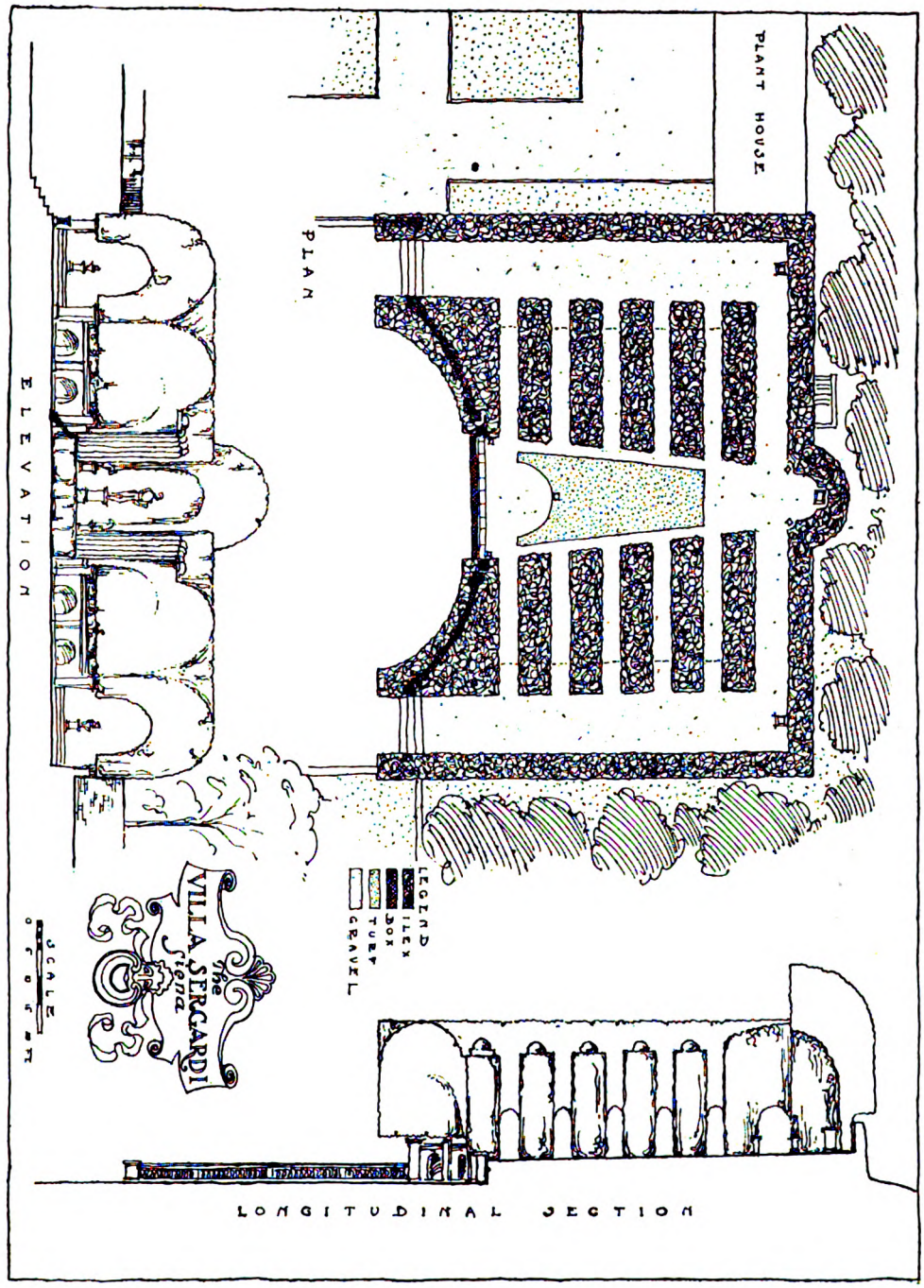
back by a yew hedge ten feet high. On the main axis at the back is an opening leading into a semicircular recess enclosed and covered by clipped yew, which might have concealed a small orchestra. Or was it, perhaps,



the green-room ? There are four small wings on either side and a long "back-drop." This theatre is the least formal of the four. It is treated merely as an incident, hardly more important than any of the other features scattered about on the hillside.

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Outside the historical Porta Camollia of Siena, not far from the well-known Palazzo del Diavolo, is the Villa Sergardi, which has an elaborate and large ilex theatre. It is somewhat larger than the one at Villa Gori.



The hedges are much thicker and higher and the stage narrow and deep in comparison. Its effect is rather pompous and heavy as for a theatre of tragedy. It is curiously situated directly opposite the garden façade of the house across a parterre perhaps eighty or a hundred feet wide. The

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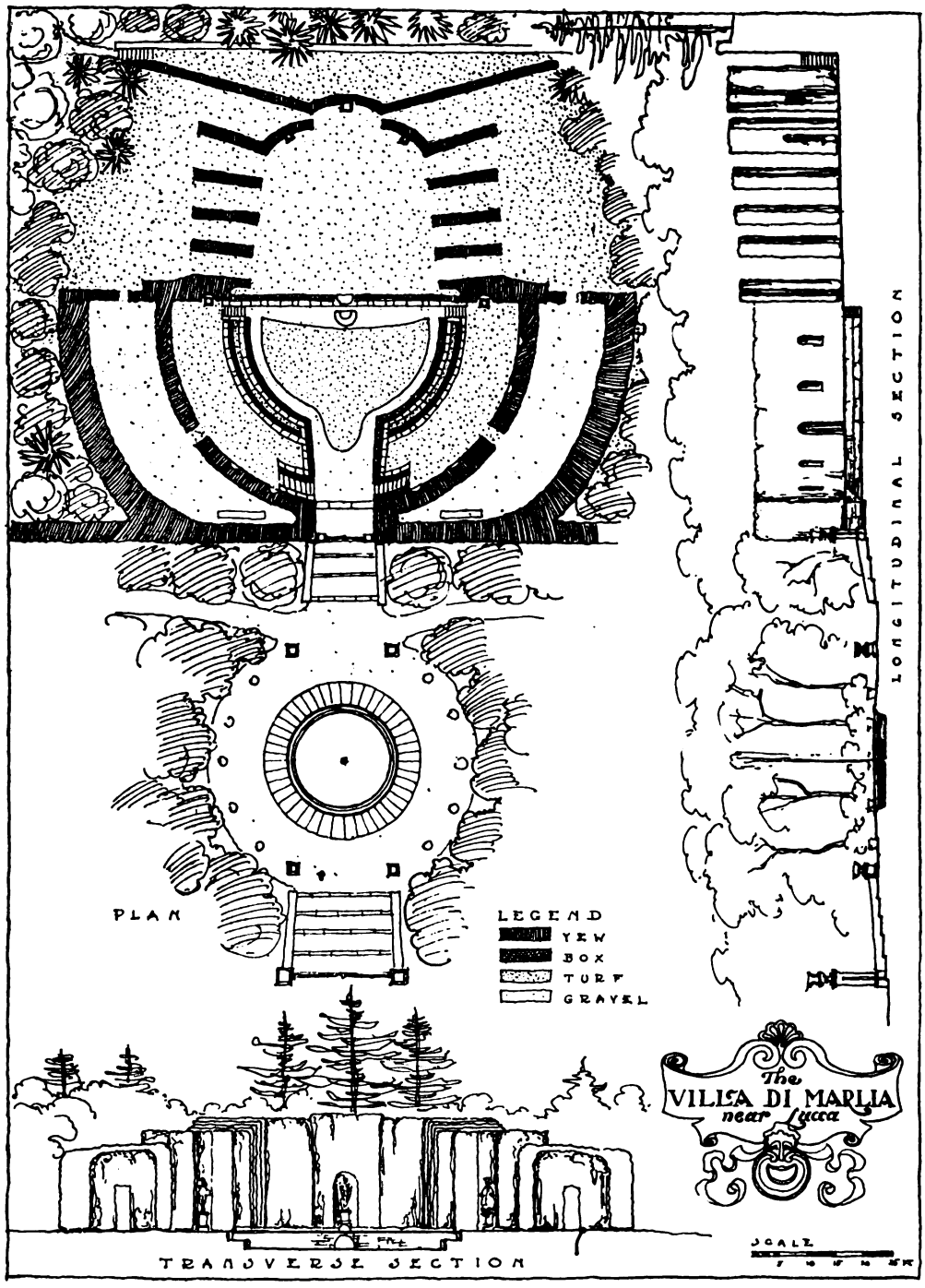
rest of the garden descends in terraces from the parterre on an axis at right angles to that of the house and theatre. Owing to this arrangement there is no place for the pit and one must suppose the audience to occupy the windows of the house. The rise of the stage is concealed by a box hedge four feet high. At either side the entrance to the wings is by a covered alley of ilex, running completely around the theatre. The wings, of which there are four on each side, are six feet thick and eighteen feet high, while the passages between are only three to four feet wide. These together with the pleached alley form an apparently solid mass of green. At the back of the stage is a niche cut out of the ilex some twenty feet high, at present containing a large and very poor statue of Bacchus. The topiary work here is more elaborate than in the other theatres; in fact there seems to be a rather unsuccessful striving for effect. Its plan is the least practical of the four. The stage is much too narrow and deep, while the hedges forming the wings fill up all the space which should have been left free for working space.

A few miles outside of Lucca in the direction of Bagni di Lucca lies the Villa of Marlia. The estate originally belonged to a noble family of Lucca, but now it forms part of the royal lands. The gardens have been much changed at various times and now the formal part is quite remote from the house. There is a terrace with a large rectangular pool surrounded by balustrades and with a fountain at either end. At right angles to the long side of the basin, runs a secondary axis which is terminated by a charming yew theatre. Between the theatre and the large terrace is a " rond-point " in the centre of which is a magnificient jet of water, which, unfortunately, spouts much too high for the size of its pool. Seven steps ascend from here to the level of the " pit " of the theatre. This semicircular space, covered with turf, is surrounded by a terrace nine feet wide raised about three feet above it. The terrace steps down forming two rows of seats in the manner of a Greek theatre. Enclosing the pit is a yew hedge sixteen feet high through which one passes into a covered walk communicating with the space back of the wings. The stage is large with a sloping turf floor. There are the usual four wings on each side and a sort of triple " back-drop " with a niche for a statue cut in the middle. The theatre was evidently cut from the side of a hill, for immediately back of the stage is a retaining wall some twenty-five feet high, and one sees some magnificent pine-trees towering above the hedges. In front of the stage is a chair cut out of yew as for the director of an orchestra and also a little yew hood for the prompter. This theatre is the most practical of all as regards seating space for the audience. The stage also is wide and not very deep and there is admirable working space outside the wings.

In these four theatres the type of the " teatro di verdura " seems to be well-established. They vary only in minor details. Aside from any possible usefulness they serve admirably as garden architecture to terminate a vista, for they give a spot of interest which, while it may lack the

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variety of an arrangement with water, presents a vivid picture to the imagination. As one comes out of the shade of the long alley at the Villa Gori it is not hard to picture Pavlova dancing on the smooth sand of the



stage. At Marlia the short turf sprinkled with cyclamen and daisies just as one sees the ground in Botticelli's "Spring," makes one think of the frivolous diversions of a gay Decameronesque company. And in these days of simplified stage-setting, what could be more admirable than the

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even and monotonous green background which serves the imagination equally for forest or palace ?

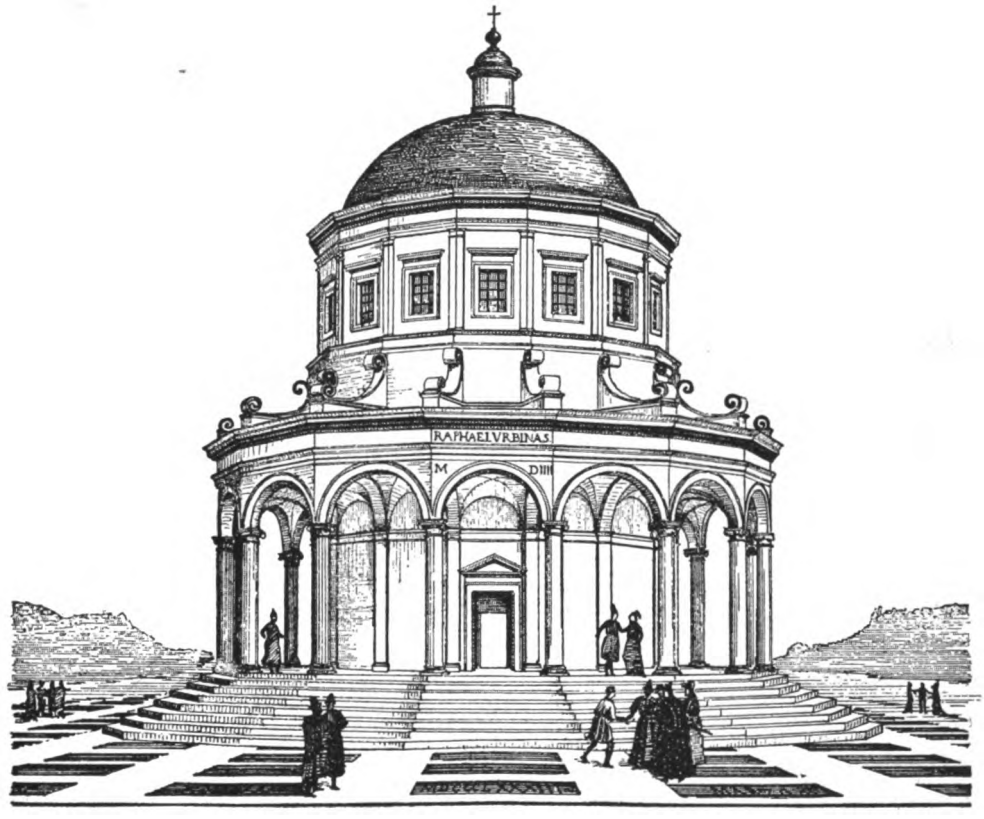
The possibility of the introduction of such a feature in an American garden is fraught with the difficulties of our climate. The nervous strain of hoping for good weather for an out-of-door performance exhausts both audience and players long before the appointed day. Besides, there is the initial difficulty in our climate — speaking for New England — of finding the growth suitable for hedges. It does not however seem entirely impossible; the native juniper or the hemlock may be used, although difficult to train, and there are still more possibilities in deciduous growths, for our gardens are only practicable during the summer months. One can imagine a summer garden-stage where a Ben Greet performance might meet with greater success than amongst the usual collection of brush and propped-up fir-trees which constitute our temporary out-of-door theatres.

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RAPHAEL AS ARCHITECT

By KENNETH JOHN CONANT, '15

RAPHAEL Santi was born on Good Friday, 1483, in Urbino. His father, formerly well to do, had suffered losses in a fire, and was obliged to make use of his ability as a painter to earn his living. He was not a great artist, but we can see here one of the influences which made his son turn to art. Another is to be found in the atmosphere of the time — the flower time of art — and the subtle stir of the Renaissance which urged men on to do things. It must



THE TEMPLE FROM RAPHAEL'S SPOSALIZIO
From Geymüller's "Raffaello"

have inspired Raphael and prompted his wonderful genius to the flights it made. The new force made itself felt in Urbino through the celebrated Duke Federigo, patron of literature and art, who built the fine palazzi at Urbino and Gubbio. Geymüller believes that the former attracted Raphael toward architecture and left its trace in his later work.

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We know little of Raphael's boyhood, except that his mother died in 1491, and that his father followed her in 1494. Just what happened to the boy then and where he passed his apprenticeship is not certain; however, by 1500 he was in Perugia working with the painter Perugino, but probably as assistant rather than apprentice. His first independent painting of importance — a Coronation of the Virgin — was done in 1503.

Since this article takes up Raphael as an architect, no general consideration of his painting will be entered into, but a picture painted at about this time, the famous Sposalizio, has from this point of view a special interest. The marriage represented being a civil one, it takes place outside the Temple of Jerusalem which forms the principal feature of the background. In this building we get the first glimpse of Raphael's architecture — for the design is distinctly Raphael's and bears no resemblance to what the Jewish Temple must have been. It is unmistakeably a Renaissance design — sixteen-sided, set on an eight-stepped stereobate, surrounded by an arcade, and domed. Already it suggests the refinement for which his later architectural work was distinguished. Perhaps it is not a thoroughly practical building, but, what is more important for the picture, it has an interesting shape, fills its place agreeably, and piles up well.

The detail is worth notice since exquisite rendering makes this possible. There are sixteen columns in the arcade, which is really a loggia ingeniously bent around the building. The columns lack entasis (not altogether a misfortune from the standpoint of effect in the picture) and have ugly flattened-out Ionic capitals. From these the arches spring directly, without an objectional intervening fragment of entablature; from them also spring the ribs which divide the vault into compartments. Each compartment is a groin vault. To carry the dividing ribs pilasters are applied to the corners of the temple wall with good effect. A charming crowning entablature finishes this interesting loggia or arcade. Above, buttressed by consoles, rises a sort of clearstory. This also has pilasters on the corners, but unlike those of the lower story in that they are bent around the angles. Between them are some beautifully enframed windows, while on them there rests the distinctly pleasant crowning entablature. The dome is without feature.

This consideration of the temple is justified by the fact that it shows Raphael to have been as early as 1504 a master of architectural form. It shows the careful delicacy of design, mass, and moulding, the general over-all delightfulness which characterizes his work, betraying the Florentine influence to which these qualities are partly due.

In 1504 Raphael went to Florence. While he busied himself with painting, not architecture, the Flower City's buildings must have influenced him and had their effect in maturing him as an architect — Florence unquestionably had the finest collection of buildings in the new style at that date. The master's rapidly increasing fame as a painter occasioned his call to the Pope's service in Rome in 1508. Thither he

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hastened, leaving uncompleted paintings behind him, and there he was occupied until the end of his life.

The first building ascribable to Raphael dates from 1509, a very short interval after his arrival at Rome. Possibly his kinsman Bramante, already there, had something to do with his getting the commission or accepting it, but this is conjectural. The design called for was a small church, S. Eligio degli Orefici, and the plan is interesting because it contains the germ of Bramante's solution of the dome-pier problem. There can be little doubt that it was suggested by Bramante's studies for St. Peter's which had been begun in 1506. Geymüller refers it specifically to one of the side domes shown in one of Bramante's still existing studies. Exteriorly a square with an apse at the back, interiorly it is cruciform, with the corners thus left used for chapels. Over the crossing in the main part of the church is a dome on pendentives. Our attention rests on the supports of the dome — they are a success. The pilasters bearing the imposts and arches are set back from what would be the corner, and the space between is cut off; thus an octogon with very tiny alternate sides is formed, footing thus being provided for the pendentive. As suggested before, this part of the plan was doubtless influenced by St. Peter's; the solution of the problem here differs from that in the larger building only in the width of the narrow sides of the octogon, a modification called for by the smaller scale.

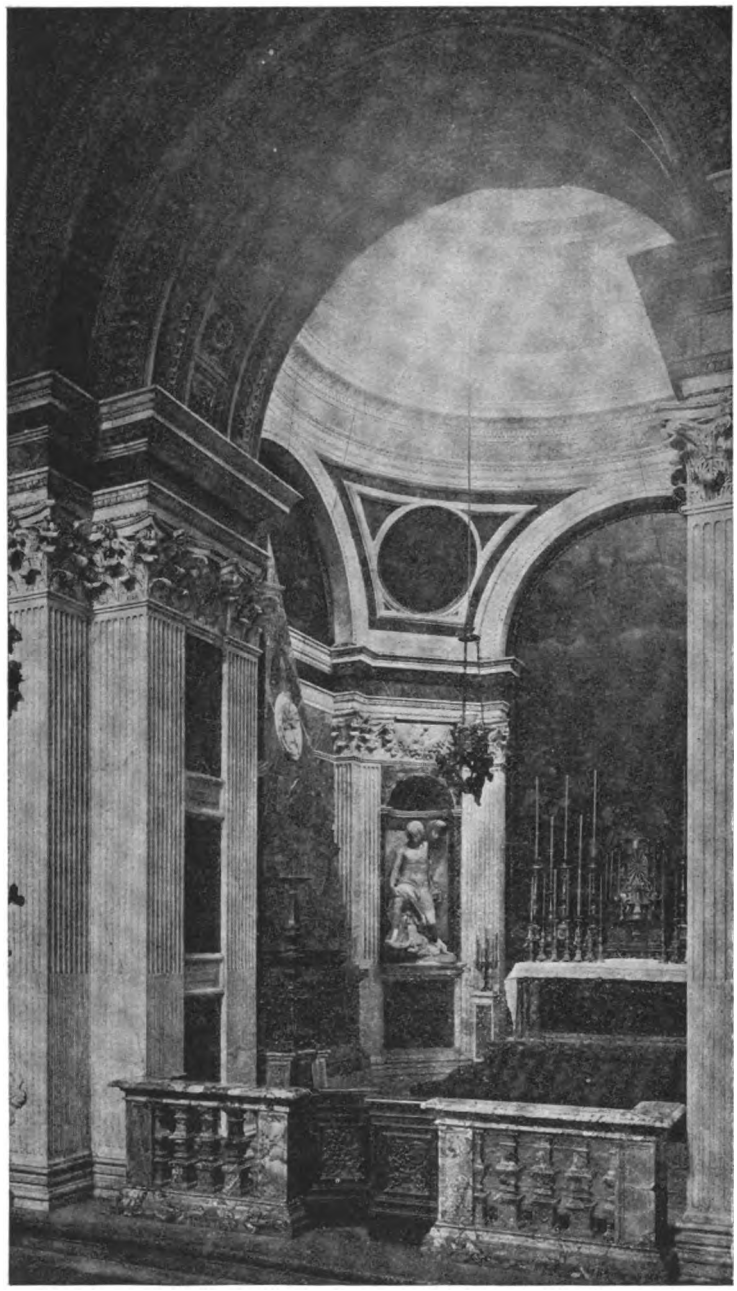
Turning to other features of S. Eligio, we find the interior lighted by " Palladian " windows in the end-walls of the arms, by bulls-eyes in the drum of the dome, and by an eye in the dome itself. The dome, too, is interesting, being hemispherical within; it tapers, and this gives it an odd squat shape exteriorly. Surmounting it is a rather peculiar lantern of circular plan with eight radial buttresses. The latter are set upon delicate pedestals, starting from which they curve inward. Between them are the arched openings. A cornice, hemispherical roof, concave, orb, and cross finish off the design. The dome and lantern are open to unfavorable criticism, though it must be admitted that there is a certain charm about them. The buttresses of the lantern make that feature look too spread out at the base — the pedestals also interrupt the movement of the curves in a somewhat unpleasant manner, nor do the buttresses have that appearance of inevitableness which marks the finest design. However, as remarked before, there is much that is charming about the dome and lantern. The remainder of the exterior does not belong to this period.

Raphael's pier treatment in S. Eligio degli Orefici suggests his connection with Bramante at Rome. The association of the two was very close; Raphael was Bramante's special pupil, and was prepared by him to take up his work as " executor." It is known that Bramante planned to have Raphael succeed him as architect-in-chief of St. Peter's. The irresistible impetus of Raphael toward the style of the High Renaissance was but natural under the circumstances. Its result for his work was an increase

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in breadth and largeness of conception, a freedom and boldness — yet without loss of Florentine exquisiteness. This is the especial charm of Raphael's work — the sweep of it, together with delicacy and refinement.

Bramante's influence is clearly seen in his pupil's Capella Chigi of S. Maria del Popolo. The exterior with its window-pierced drum, conical roof, and inconsequential lantern is not remarkable. It is the interior which is epoch-making, for in it Bramante's final solution of the dome-support problem first emerges. Though the motive is more properly used on a larger scale than that of this chapel, a fact which gives some basis for criticism, the chapel is very beautiful nevertheless: in spite of a suspicion of overheaviness, a marvel of charm.



THE CAPELLA CHIGI IN SANTA MARIA DEL POPOLO, ROME

One enters it from the church through a deep semicircular arch which proves to correspond to slightly-projecting arches on the three other sides of the square, whose corners are cut off and form the piers that carry the dome. Thus the four arches with their immediately supporting pilasters make up the long sides of the octagonal plan, the short sides being formed by the piers which carry the pendentives, the latter by this device gaining a solid, capable-looking basis. These shorter sides are relieved by niches below the entablature, which encircles the space at the opening of the arches and which is

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carried by the Corinthian pilasters defining the piers and emphasizing their function of support. This is precisely the scheme on which the great piers of St. Peter's were already rising under Bramante's direction. The dome above has no eye, as sufficient light is admitted through eight rectangular windows in the drum.

Raphael designed and supervised the decoration of this chapel, which is only another way of saying that it is very well done. The mosaics were made from Raphael's cartoons by Luigi della Pace. The wall space between the pilasters is taken up by marble panneling on the long sides, within the three blank arches, and (as already noted) by niches with statuary on the piers. Next above the entablature come (alternately) the arches with their lunettes and the pendentives — the lunettes and pendentives decorated in mosaic. Next above is an entablature, circular in plan, and oddly profiled, for the architrave is far-projecting and the frieze narrow. Probably the explanation lies in a desire for a rich and definite accent at the point where the drum begins. The drum is simply treated with an alternation of mosaic panels and windows; above it (the springing marked by a small entablature) rises the richly ornamented dome. All of the mouldings show Raphael's delicacy, and perhaps it is the same quality that carries the scheme, so rich and so agreeable, with so charming an air of refinement about it. The Capella Chigi was planned in 1512 or 1513.

At Bramante's death in 1514 Raphael succeeded to that artist's position as architect-in-chief of St. Peter's, first with Fra Giocondo, then with Sangallo as associate. He worked on St. Peter's until his death, and it might, therefore, be well to mention, before taking this up, his loggie in the Vatican, which were completed earlier.

It is not clear that Raphael is to be credited with the architecture of these loggie. The most charming, the so-called Raphael's Loggia, is often attributed to Bramante and its decoration only to Raphael and his assistants. It is possible that he designed it, working as Bramante's assistant. A certain air about the whole design, a certain charm in the mouldings, a certain refinement generally, makes it not improbable to connect Raphael's name with this loggia. Now it is a loggia no longer, but glazed to protect the marvelous color work with which it was decorated under Raphael's direction. This, rather than the architecture (exquisite though it is) forms its chief claim to celebrity. We are told that visitors are so absorbed in studying Raphael's triumph in decoration that they never notice how carefully thought out, how beautifully proportioned the structure is. Thereby they compliment it, for grossness would attract their attention doubly here.

We now turn to the last of Raphael's ecclesiastical work, done after 1514. In these labors on St. Peter's he regarded himself as merely continuing the work of his master. It would indeed have been fortunate if he could have finished it, for St. Peter's would be a finer building today. As

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it was Raphael died only six years after he came to the directing office — died in his early prime, when he might well have expected to live many more years. Construction proceeded very slowly during Raphael's term, so that its results are less than could be wished.

Geymüller attributes the following work on St. Peter's to Raphael:



RAPHAEL'S LOGGIE IN THE VATICAN

1. Two designs or models.
2. Parts or all of the two piers just east of the eastern pair of great piers.
3. Two piers in a corresponding position to the north, if not already carried out by Bramante.
4. Considerable work on the north chapel.
5. Arcades in the south transept (taken down by Michelangelo).

Much of what was executed under Raphael has been altered, so that altogether not a great deal remains. Since, moreover, Raphael was only following more or less in Bramante's footsteps, his work on St. Peter's

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cannot claim much attention. Such of it as remains — one niche in particular — shows the delicacy and care which characterize his style. One of Raphael's plans is worthy of notice. He yielded to the ever-present ecclesiastical pressure and designed a three-bay extension for the nave. The plan calls for ambulatories but no domed chapels; it is simple and commendable in many ways. But, after all, in St. Peter's Raphael did not have a real chance to show what he could do.

Having finished the discussion of Raphael's ecclesiastical work, we can return and follow out his private buildings. The latter fall into two classes, villas and palazzi.

The Farnesina is the first of the villas. Its authorship has been disputed, partly as the result of a passage in Vasari. By some the building is attributed to Baldassarre Peruzzi, by others to Raphael, while to many a division of honors between the two seems most proper. Peruzzi's style has much the same characteristics as Raphael's, in fact very much so, and collaboration was quite possible. There is at least some ground for believing that the general design was the work of Raphael. Perhaps some significance could be attached to the fact that the building was for Agostino Chigi, the man for whom the Chigi Chapel was designed not long afterward.

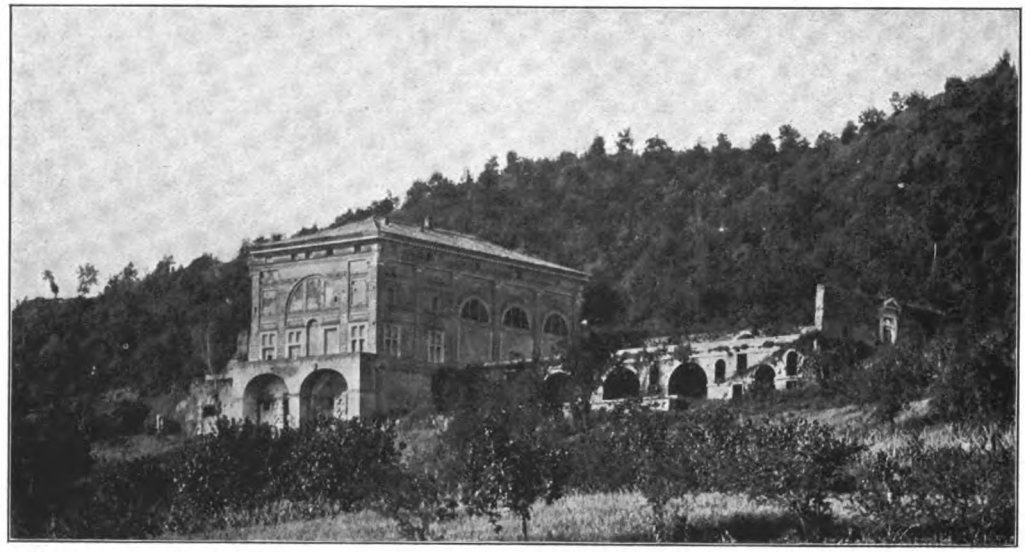
The villa, then in the country, was situated on a roughly trapezoidal plot of ground with the Tiber on one of the long sides, the Via della Longara on the other. From this thoroughfare one enters the large court preceding the main building. An inviting loggia, now glazed, forms the central feature of the façade, flanked as it is by two projecting wings. This loggia was rather an open room than a loggia, and the same may be said of a similar smaller adjacent hall which fronts on the river. The other large room on this floor is closed in, but communicates with the garden in the rear. From it, also, the main stairway rises. Smaller rooms to the number of four complete the lower story; the upper story was given over to sleeping rooms. A subsidiary building, placed at a corner of the estate on the shore, served as a garden house. It had an open vaulted chamber fronting on a little area on the land side and four connected rooms, all vaulted, facing toward the river. Between this building and the dwelling stretched a large open garden, while the remainder of the ground was wooded, in part (along the bank and garden) by shade trees, in part by an orchard. There were paths, but no particular design was made for the layout, except in the garden.

From this description it is evident that the function of a villa was different from that of a palazzo in important particulars. First of all, it was not a place of permanent residence, but rather a resort to go to when the city climate became insufferable, — when the owner craved such amusement as a week-end could offer or a festive party could give. Hence the number of open rooms, the large garden (impossible in a city), the grove, the garden house.

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The appearance of the villa buildings leaves something to be desired. They are not failures, and it is easy to perceive that there is a certain festive quality in the design, suggested by the purposes the establishment was intended to serve. The garden house was treated simply with a Roman Doric pilastered arch order. A tile roof, broken only by a curious sort of look-out, finished it off. On the river side the loggia rested on a high battered wall, made interesting by six arched openings apparently belonging to a grotto. In general aspect, especially from the Tiber, this little building was admirable, but unfavorable criticism may well be directed at the unbroken monotony of the arch order and the palpable weakness of the angles. Mention should be made of the exquisite detail.

The main building is not entirely satisfactory. On the court side, the wings project too boldly for their width. This weakness is augmented by



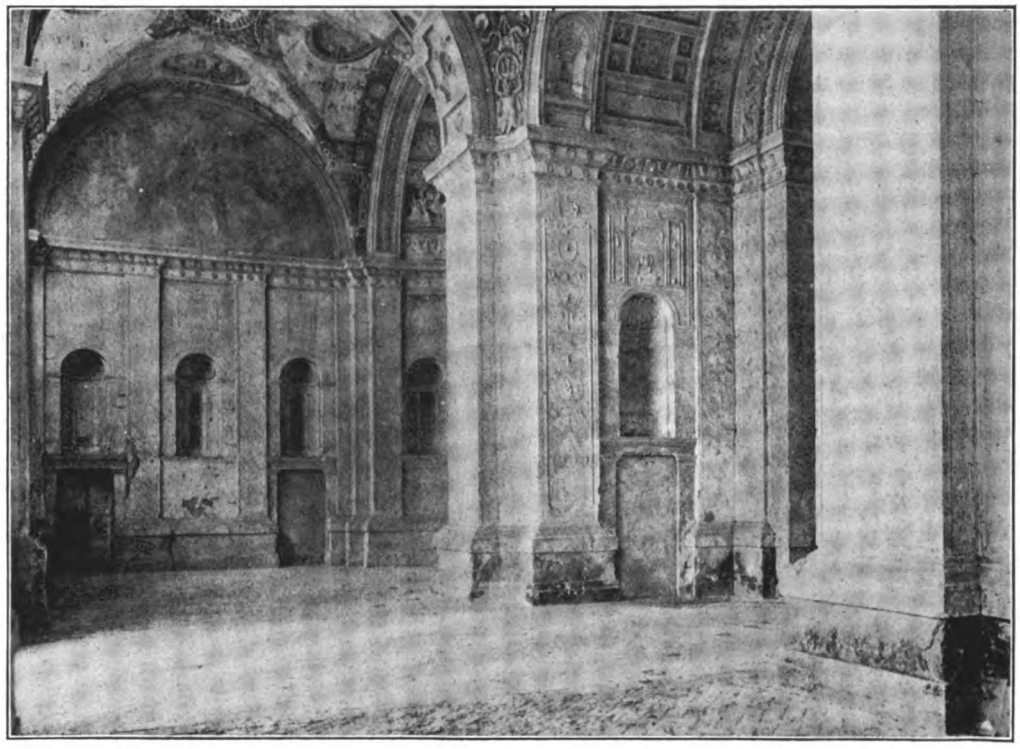
THE VILLA MADAMA

the attenuated decorative order, and, quite aside from such an objection, the orders do not seem to be properly related. The pedestal courses do not appear to be well managed, the intermediate entablature is too nearly full, the windows somehow do not fit in gracefully. Charming cupids in the main frieze cannot make up for the ugly little windows cut in that member. Nor are the angles very well treated. The loggia on the third story of the river front distinctly injures that portion of the design. Thus, in spite of an excellently disposed plan and very beautiful detail, the Villa Farnesina can hardly be called an unqualified success. In leaving this building it may be noted that Raphael's Cupid and Psyche paintings adorn the principal hall. The dates given for the start of construction on the villa are 1509 and 1510. The decorations of the Cupid and Psyche story were designed by Raphael in the last years of his life and were somewhat poorly carried out by his pupils Giulio Romano, Francesco Penni and others.

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Raphael's other villa is not only more extensive, but more successful. It enjoys the distinction of being the first villa in which the grounds were designed in connection with the buildings, and as such, even unfinished and ruined as it is, it has a valid title to fame. The design was made, so Geymüller believes, in 1517, for Cardinal Giulio de' Medici afterwards Pope Clement VII. The villa is now known as the Villa Madama.

Great opportunities were presented by the site, and advantage was taken of them in the plan. The property lies on the slope of a hill with a logical entrance at the upper end. From this height there is a more or less gradual descent splendidly adapted to formal gardens. Here was laid the foundation of Italian garden design. Credit for this epoch-making



THE LOGGIA OF THE VILLA MADAMA

achievement is sometimes divided between Raphael and Giulio Romano, but in any event the great Bramante ought not to be forgotten, because the inspiration of his treatment of the Vatican court is clearly traceable.

At the upper end of the grounds is the dwelling, never finished, and now partly ruined, but easy to restore. The road from Rome was to lead through an imposing tower-flanked entrance wall into a large forecourt. From this court the house was to be reached by a great flight of steps, a device effective not only on account of the added impressiveness thus given the approach; but, because by having the house raised, the slope of the hill could be utilized to more splendid advantage. The habitation itself was planned with a fine circular court in the center, entered through a passage from the steps. Beyond, a corresponding passageway leads to a

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remarkably beautiful loggia and thence into a large open court from which in turn one reaches the basin and grotto at the lower level.

The loggia merits especial attention. Externally it appears as an arch order, internally it is a charming series of vaults worked together in the pleasantest manner imaginable. The central vault is a dome on pendentives, the piers planned as in S. Eligio degli Orefici, and beautifully proportioned. The two side bays are groin vaulted and splendidly managed. The side wall is niched under these vaults; one of the end walls is also, while the passage (at the back of the domed bay) is barrel-vaulted. Together these vaults make a perfectly charming composition—there is a freedom, a frankness, an openness, an inevitableness about them that deserves the highest praise. Very great credit is due Raphael also for the way in which the loggia is ornamented. The proportion, scale, and massing of the ornament is most excellent. In detail it is astonishingly beautiful. Particularly noteworthy is the delicate way in which the piers are designed to accord with the type of vault they carry. One side of the pier preparing for the dome, the other for the groin vault.



DECORATION OF CROWN OF APSE VAULT
VILLA MADAMA

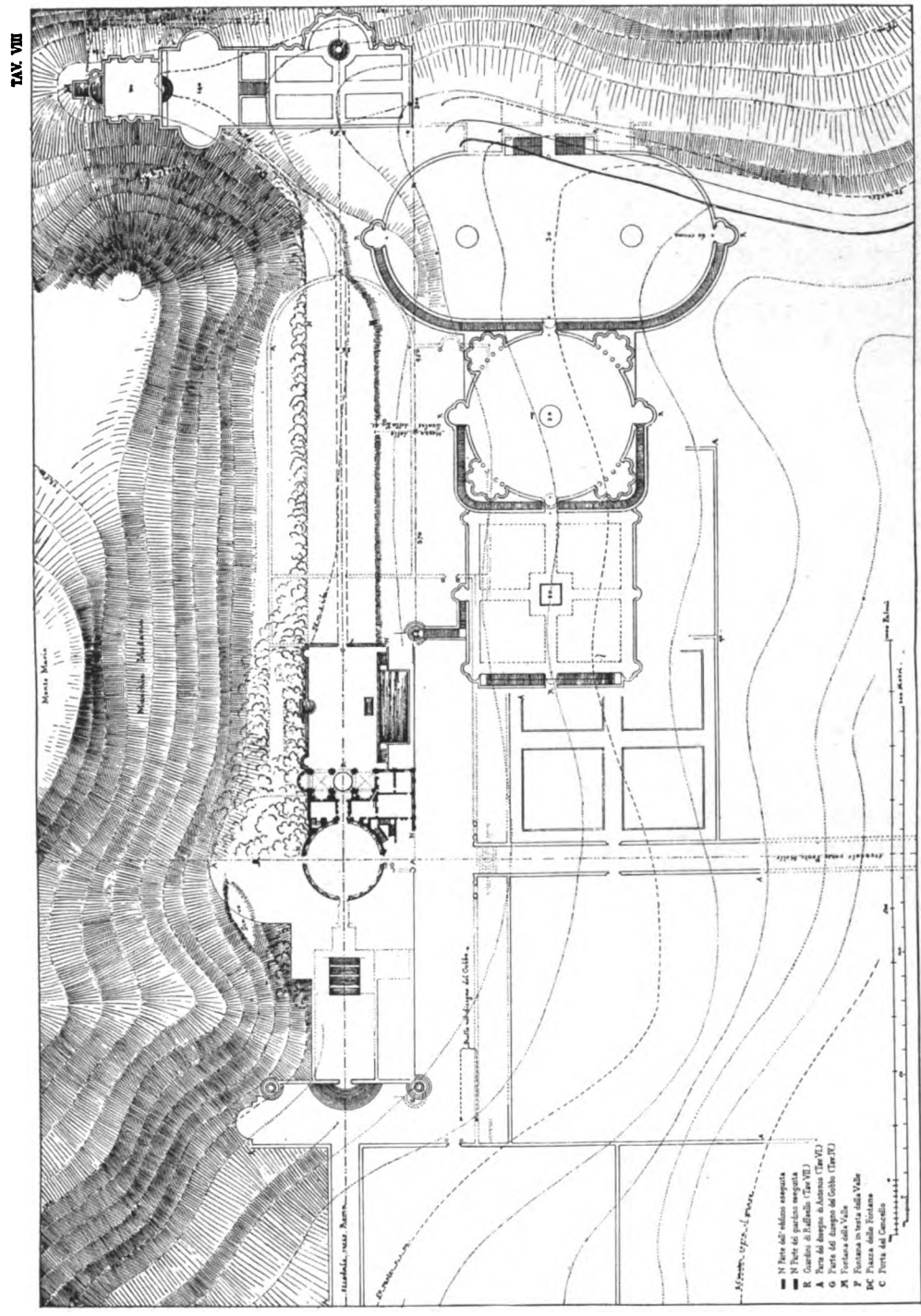
The basin and grotto below were never finished, but in the rough we can see a composition of great majesty and something of Roman largeness. On the level of the lower story of the house it, like the house, fronts on the open space from which the gardens were to have been reached. Reference to the accompanying map (from Geymüller "Raffaello studiato come architetto") will make the relation of the various parts of the plan clearer than explanation could possibly do.



THE POOL OF THE VILLA MADAMA

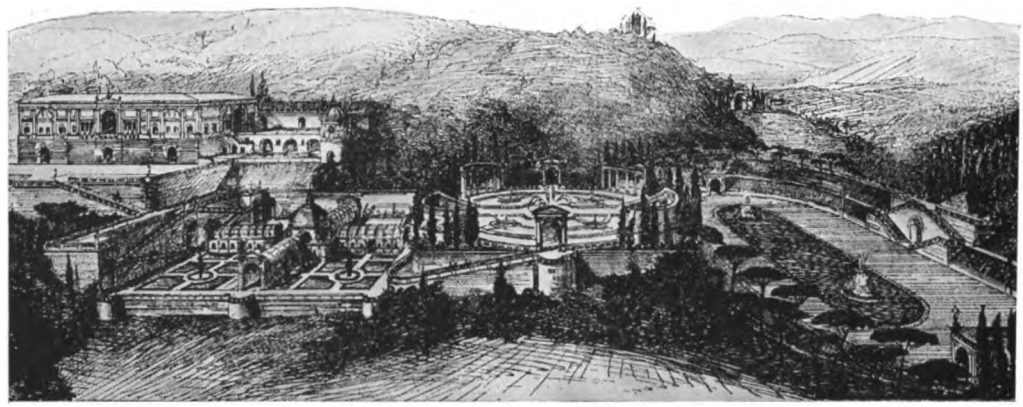
The area given over to gardens was divided into compartments in the way that later became general, having to recommend it the fact that it increases the apparent size of the place, gives an air of seclusion and mystery, and makes possible an interesting variety of treatment. In idea

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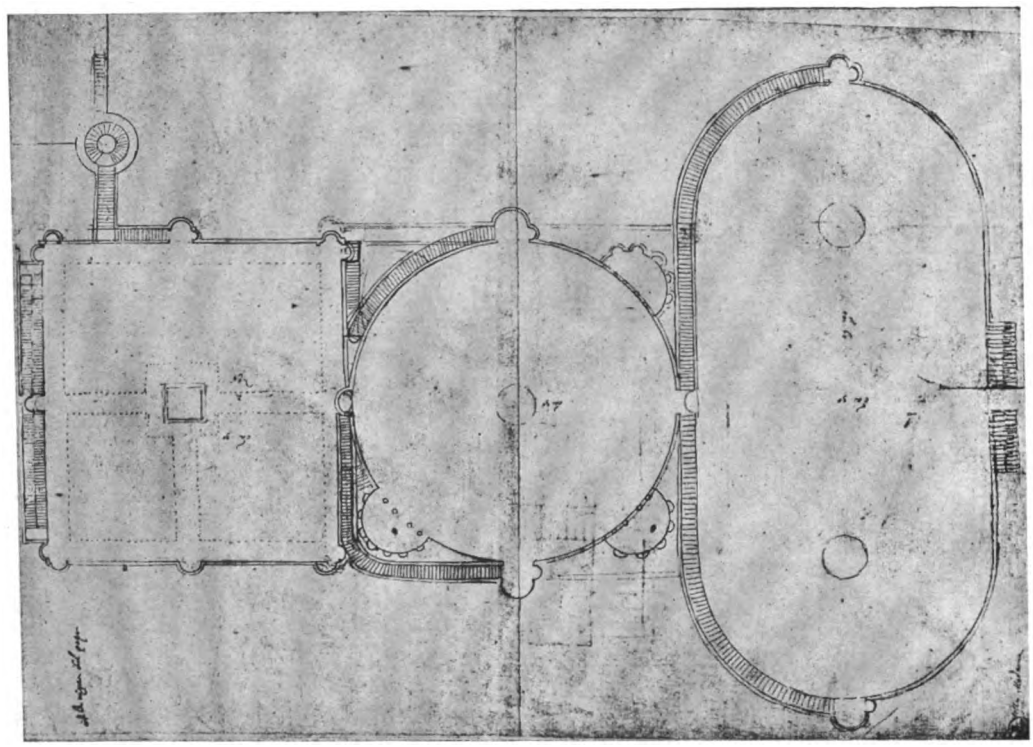


PLAN OF THE VILLA MADAMA, SHOWING THE EXISTING BUILDING AND THE PROJECTS FOR THE GARDENS BY RAPHAEL, ANTONIO DA SANGALLO AND GOBBO
From Geymüller's "Raffaello, architetto"

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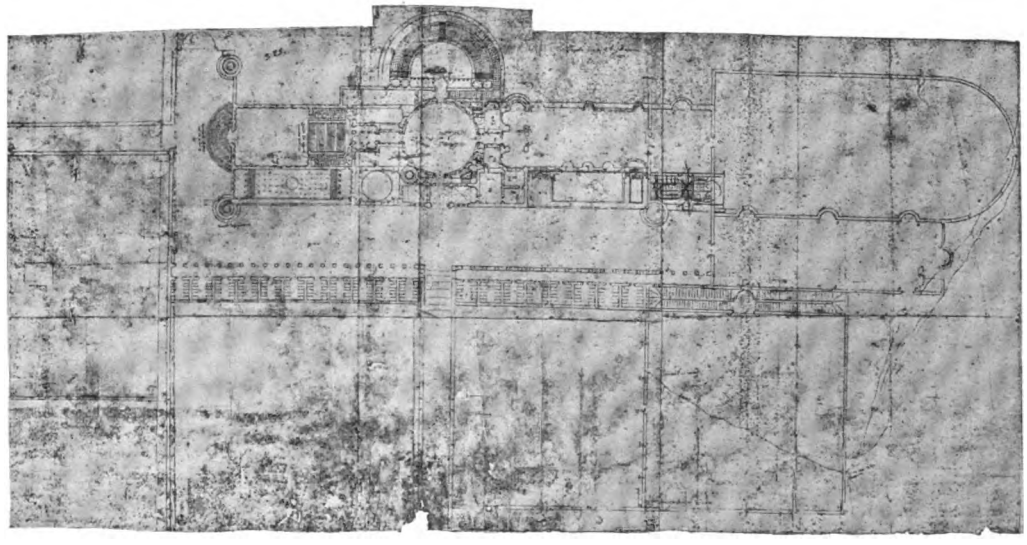
RESTORATION BY H. V. GEYMÜLLER OF RAPHAEL'S SCHEME OF THE GARDENS OF THE VILLA MADAMA



RAPHAEL'S PLAN FOR THE GARDENS OF THE VILLA MADAMA
From Geymüller's "Raffaello, architetto"

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the garden was a series of roofless outdoor apartments, each treated in a distinctive way. Raphael's plan was irregular and did not show as much use of the axis as later plans do, but it was certainly a fine design. The lowest level with its squares of verdure; the middle level with its picturesque approaches, entrance arches, exedrae, and fountains; the third level with its pleasing shape, its restful boundary of terraces, its fountains and terminal features — these made a very splendid composition clearly suggested by the descriptions of the gardens of the ancient Romans. The freedom, sweep, and largeness of it were well calculated to go well with the mountain beyond. Architecture distinctly predominates in this garden, perhaps a trifle too much. The lack of a small secluded garden is noticeable, and water is not used to the fullest advantage, but one should be careful not to press such criticism too far in view of the fact that the Villa Madama is a fore-runner — that Raphael was a pioneer in garden design.



STUDY FOR THE VILLA MADAMA BY ANTONIO DA SANGALLO
From Geymüller's "Raffaello, architetto"

The villa as here described follows Raphael's plans. Subsequently other designers worked at it, with the result that the final plan was very different from the one Raphael left behind him. The developed plan need not concern us; moreover, the great project was never completed.

Consideration of Raphael's palazzi is now in order. Earliest among them, and least successful as well, comes the Cafarelli, then called the Vidoni. Later additions — a story on top and considerable extensions at either side — have altered the aspect of this palace to a great degree. They have not improved it, but it was never very beautiful, as is apparent from the drawing. The rustication of the basement is too coarse to go well with the smooth upper story. Nor does the arrangement of the windows in the basement (though it may have its merits) seem to harmonize with what is above. The applied columns weaken the design materially, and their entablature fails to satisfy the requirements of a crowning feature for the building, while the pedestals, which may be all very well in their way,

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do not seem to be agreeably proportioned in relation to either the basement below or the columns above them. Taken separately, however, the order of the second story possesses much of true Raphaelesque grace and delicacy — it is the situation, half-buried in a wall at the top of a massive basement (a basement not only too robustly treated, but proportionately much too high) that makes the order objectionable. It cannot dominate because of the basement, and the lower division of the façade cannot dominate because of it. In passing, the admirable rectangular window enframements and the pleasant court should be mentioned. The latter has a simple arcade with square piers on the lower story; above the wall is smooth with pairs of very slender pilasters at intervals. In plan the palace presents no unusual features, and as a whole it deserves no great praise.

In the Palazzo dell' Aquila, now demolished, Raphael achieved much more pleasing results. This building had a Roman Doric arch order, engaged, for the lower stories. The order was well proportioned (peculiar in that it lacked a frieze) but its use, illogical, was regrettable. The balustrade of the order served (above the columns) as pedestal for statues and (above the arches) as pedestal for the charmingly enframed windows of the middle story, the top moulding of the balustrade being the sill course. This arrangement and the order-and-pediment window enframements are characteristic of the period of the High Renaissance; it will be noted that the cornice came at the sill line, which is unusual in High Renaissance palazzi. The treatment of the upper stories with their graceful distribution of spots and interesting stucco ornament calls for our admiration, though it must be confessed that the angles were not very satisfactory. According to Geymüller the palazzo was completed in 1520.

Finally, we come to Raphael's most successful palace, the Pandolfini at Florence. The Pandolfini is more typical than the others of the fully developed High Renaissance scheme, though it is exceptional in several respects. For example, instead of a court it has an open garden, shut off from the street by a one story ell (an unusual feature), while the entrance is a loggia fronting on this garden. That is, one entering passes through the ell into the garden, then into the loggia and thence into the vestibule from which the stairway rises. A room to the left of the entrance passageway was fitted with a separate entrance and served as a chapel. It is believed that the peculiarities of the building result from the desire of its owner, Gianozzo Pandolfini, to use this dwelling as a sort of urban villa.

The steady-looking doorway, the well-managed rustication, the dignified simplicity of the stucco wall cannot help impressing the beholder, already charmed by exquisite proportion. Perfectly delightful enframements, ordered and with pediments in the usual High Renaissance fashion, surround the windows. There is a thorough-going satisfactoriness about them that is doubtless due in part to the fine execution of their well designed detail. Admirable also are the logical belt course (typically High Renaissance) and the baluster-pedestal course which surmounts it. The

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lettered frieze and really magnificent cornice crown the building beautifully. It would not be fair to forget the charming entrance loggia with its lovely capitals. The palace is carried out elaborately within: there is much fresco, and many of the ceilings are ornate.

The Pandolfini is certainly one of the most satisfactory of High Renaissance palazzi. It has that atmosphere of benign repose—so difficult to define, but so easy to feel if one is rightly attuned—the atmosphere which seems to go with really great work. This structure, begun in 1517, was not complete in 1520 when Raphael died, at thirty-seven and in his prime.



THE PANDOLFINI PALACE, FLORENCE

Raphael was a great architect; he would merit attention even if he had never painted the lovely pictures for which he is chiefly known. We should not hesitate to put him as architect beside Bramante and Michelangelo. The Capella Chigi, the Villa Madama, the Palazzo Pandolfini, each exemplary, showing Renaissance architecture at its best, entitle him to that. Consider how many great features each had about it, showing not merely refinement, but a logical expressiveness which Renaissance architecture so often lacked. Sweep and freedom were not enough for Raphael — to him we are indebted for some very lovely detail as well. One cannot give too high esteem to Raphael's best work in architecture, for in consistency and harmony of structural expression or in its delicacy and refinement it is scarcely excelled. It touches that perfection which Renaissance architecture sometimes suggested but seldom attained.

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THOMAS JEFFERSON AS ARCHITECT: MONTICELLO AND SHADWELL

BY SIDNEY FISKE KIMBALL, A.B., M. ARCH.

THE bringing to light of the main bulk of Thomas Jefferson's drawings and books of calculations among the papers of the late T. Jefferson Coolidge, Jr., and the finding of unpublished documents in the Library of Congress, the State Library at Richmond, and the Library of the Massachusetts Historical Society should now make possible a survey of Jefferson's activity as an architect which shall be measurably complete.[1] The surmises which fill even the most recent treatments of the subject ought soon to be replaced by deductions from evidence which leaves little to be desired in fulness. Although the Coolidge drawings include a number easily referable to Clérisseau, Mills, Hoban, Hadfield, and others, the great majority can have been made only by Jefferson. These depend on notes and calculations written on the margins in his own hand, and they display a continuity of methods and style under all circumstances throughout a range of years, 1770–1826, that renders unthinkable any other authorship than his.[2] Aside from its interest as regards Jefferson, the Coolidge collection offers the fullest evidence yet brought to light concerning the design of buildings in America prior to the competition for the national Capitol. Nowhere else can the mental processes and the development of the designs of an early American architect be studied so closely. In this paper, after a preliminary summary of the sources and growth of Jefferson's ideas concerning architecture, attention will be confined to his buildings at Monticello, where his first work was executed, and where he continued to build throughout his life.

[1] It is unnecessary to trace here the transmission of Jefferson's letters and manuscripts, which aggregate about forty thousand pieces. The authenticity of the documents which form the basis of this paper may be regarded as definitely established. All of the papers referred to, excepting official records, have passed only through the hands of Jefferson's descendants; Jefferson's characteristic handwriting, moreover, is unmistakeable. The provenance of the architectural drawings is the same as that of the collection of Jefferson's private papers, 15,000 in number, presented by Mr. Coolidge to the Massachusetts Historical Society and published in part in 1900.

[2] It may be useful to recall briefly the principal events of Jefferson's life: Born, April, 1743, he graduated from William and Mary College in 1762, was Governor of Virginia, 1779–1781; Minister to France, 1784–1789; Secretary of State, 1789–1793; Vice-President, 1797–1801, and President, 1801–1809. From 1817 to his death, 1826, he was Rector of the University of Virginia.

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Special interest attaches to the drawings for Monticello, not only as the most complete set among all of Jefferson's designs, but as illustrating the inception of a typical Virginia mansion of those days, and exemplifying the early and radical innovations by which Jefferson brought about, ultimately, the transformation of the type. The difficulty attending the identification and study of these drawings is very great. Of the whole number of drawings left by Jefferson and now in the Coolidge collection, more than three hundred sheets, not one bears a formal title.[1] Except for two drawings by Mills and one by Lenthall none of them are signed. Only four drawings bear dates. Identification of subject, authorship, and sequence must be established by comparison with existing buildings, by evidence from other documents, such as the books of calculations, letters, descriptions and early representations of the buildings, and by a minute study of the drawings themselves. In the case of Monticello especially it will be found that if we are to recognize early drawings, which at first might seem to present no analogy to the existing building, all the documentary evidence must be studied first. After an examination of the house as it now exists, the drawings may then be traced backward without a break through successive projects, so as to reconstitute the architectural history of the building and to permit a study of its sources and its significance.

I. Jefferson's Ideals in Architecture

That Jefferson's interest in the fine arts was probably awakened by the conversation of Dr. Small and Governor Fauquier's circle, and that the reform of the curriculum at William and Mary during Jefferson's own governorship is an early testimony of this interest, were well set forth by Mr. James Kevan Peebles in his pioneer discussion of Jefferson as an architect.[2] The direction of Jefferson's tastes before his residence abroad, and the degree to which they were already fixed, now become evident from the manuscript catalogue of his library preserved at the rooms of the Massachusetts Historical Society. From this and other evidence it appears that before his departure, 1784, he owned such books as Leoni's Palladio, Scamozzi, Perrault's Vitruvius, Kent's work on Inigo Jones, and Gibbs's "Designs" and "Rules for Drawing the Orders," constituting, even then, one of the largest collections of architectural books in America.[3] Equally, if not more significant of his architectural ideals is the list of desiderata in the same catalogue: Desgodetz, Leroy, Stuart and Revett, Adam's

[1] The pencil titles which appear in the lower right-hand corner of the facsimiles, as well as the printed titles of the figures, are ascriptions by the author, and have the measure of validity which may be established in the text.

[2] Alumni Bulletin of the University of Virginia, vol. i, pp. 68–74, reprinted in American Architect, 1895, vol. xlvii, pp. 28–30 — a judicious discussion with thorough mastery of the rather scanty material published up to that time — still almost the only scholarly treatment of the subject.

[3] Cf. the catalogues of the Redwood Library, Newport, 1764, of the library of William Byrd of Westover in Virginia, 1777, and of the Library Company of Philadelphia, 1789, etc.

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Spalatro, White's Paestum, Wood's Balbec and Palmyra, as well as Halfpenny's Gothic Temples, and Chinese and Gothic Architecture, all works hitherto unknown in America, the forerunners of classicism and of romanticism abroad.

During Jefferson's sojourn in Europe he not only acquired the most important of these books and many others, but came into intimate personal contact with the artistic radicals of the day. Far from joining the academic rear guard whose intrenched position in France hindered the actual imitation of classical dispositions, Jefferson wished, like Catherine II, to copy the classical buildings in their integrity. Like her he was directed to Clérisseau, who later testified his appreciation of a sympathy to which he was unused in France, "in finding a true lover of antiquity." Jefferson's classical enthusiasm outran even the fondness of Clérisseau for antique forms, and in the development of Jefferson's studies for the Virginia Capitol he constantly overruled departures from the antique model which Clérisseau suggested in the interest of logical planning and practical use. Jefferson's dithyrambs on the Roman monuments of southern France are well known; he was not less enthusiastic over the contemporary effort to adapt the Roman style to modern domestic architecture. Rousseau's newly finished Hotel de Salm, now the Palace of the Legion of Honor, attracted a scrutiny which was not without its later fruits. Krafft and Ransonette's "Plans des Maisons de Paris," the *corpus* of these buildings, formed part of his library after its publication in 1802.

This marked preference for Roman forms Jefferson retained to the end of his life, and his views underwent no further essential modification. Like the French, he never turned to his books of Greek monuments for a prototype for anything more serious than a garden pavilion; he took no part in the Greek revival proper, which followed the Roman revival in America while he was still in full activity. Unlike the French at any time, he remained to the end bound by precedents and mathematical rules.

Far from being Georgian in his tendencies, Jefferson had from the first a fine scorn not only for the contemporary architecture of the colonies, which, before leaving America, he had already roundly abused, but equally for that of England itself. At the close of two months among the English he writes to John Page (May 4, 1786), "Their architecture is the most wretched style I ever saw, not meaning to except America, where it is bad, nor even Virginia, where it is worse than in any other part of America which I have seen." Still less did he attempt to imitate the forms of the Italian Renaissance as has been so frequently and carelessly asserted. In aim he was always classicistic. If at times he followed Palladio, it was because Palladio was a way to the antique, the clearest way for him till Paris endowed him with keener insight. He trusted to Palladio not only for the forms of the orders according to authentic monuments, but for "the Antients designs of Country-houses . . . in the manner that Vitru-

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vius has taught us, and that they themselves built them." Whether he followed Palladio's own version of the antique, or literally reproduced ancient buildings, Jefferson was from first to last, in intent, the most Roman of the Romanists.

II. Monticello and Shadwell

On February 1, 1770, when Jefferson was in his twenty-seventh year, Shadwell, the house of his youth, burned to the ground. "It was of a story and a half in height; had the four spacious ground rooms and hall, with garret chambers above, common in those structures a hundred years since; and also the usual huge outside chimneys planted against each gable . . . massive enough . . . to support the walls of a cathedral, instead of those of a low wooden cottage." [1] The house was never rebuilt, and Randall still saw the abandoned cellar-hole in 1851. Not until 1803 was there a proposal, and that one hitherto unnoticed, to erect a new house on the site. Jefferson's kinsman Thomas Eston Randolph, in an unpublished letter dated May 30 of that year, declines, from force or circumstances, an offer of Jefferson's to lease him the Shadwell property. The significant passage runs: ". . . the improvements you proposed to make to the buildings would render them sufficiently commodious for my family." [2] The improvements proposed must naturally have amounted to a complete reconstruction, never executed.

For his own future residence Jefferson had other plans. Already before the fire he was dissatisfied with the old house, as appears in his letter of February 21 to John Page. Telling of the loss, he speaks of certain possibilities " if this conflagration, by which I am burned out of a home, had come before I was so far advanced in preparing another." [3]

The new home was Monticello, destined to crown the nearby summit which had attracted him even in boyhood, and which he was already having levelled during his college days.[4] The garden book begun in 1769 shows that in the spring of that year he planted fruit trees there. The further account given by Randall, who had the advantage of oral sources of information now closed to us, is that towards fall he " erected a brick story-and-a-half building, containing one good sized single room — the same which now forms the southwestern ' pavilion ' (at the extremity of the south ' terrace ') of the mansion. On the destruction of Shadwell he removed thither, the rest of the family finding cramped quarters in the overseer's house." (Vol. i, p. 59.) It would seem, notwithstanding, that the building and occupation of the earliest quarters at Monticello should be placed a year later. The first letters dated from Monticello are of February 20, 1771. In one of them, to James Ogilvie, after mentioning a

[1] H. S. Randall, The Life of Thomas Jefferson, 1858, vol. i, pp. 2–3.
[2] Massachusetts Historical Society Archives.
[3] The Writings of Thomas Jefferson, edited by A. A. Lipscomb and A. E. Bergh, 1903, vol. v, p. 19.
[4] S. N. Randolph, The Domestic Life of Thomas Jefferson, 1871, p. 32.

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previous letter of October, he writes, " I have lately removed to the mountain whence this is dated. . . . I have here but one room, which like the cobbler's, serves me for parlour, for kitchen, and hall. I may add, for bedchamber and study too. . . . I have hope however of getting more elbow room this summer." (Bergh, vol. iv, p. 233.)

By this time Jefferson had certainly acquired the first of the books we find in his catalogue, both on architecture and on landscape gardening. It is not impossible, even, in view of his projects, that the older library burned at Shadwell, " principally . . . of common law," may have contained one or two, but very few books from it were saved. Drawings which must antedate the building of the house, show that the exact proportions of the orders were accessible to him, and the sentimental proposals for the development of his grounds, written in his legal pocket book for 1771, clearly show influence from the writings of the English romantic school. " BURYING PLACE: . . . The area circular, about sixty feet in diameter . . . in the center of it erect a small Gothic temple of antique appearance. . . . AT THE SPRING ON THE NORTH SIDE OF THE PARK: A few feet below the spring, level the ground forty or fifty feet square. Let the water fall from the spring in the upper level over a terrace in the form of a cascade. Then conduct it along the foot of the terrace to the western side of the level, where it may fall into a cistern under a temple, from which it may go off by the western border till it falls over another terrace at the northern or lower side. Let the temple be raised two feet for the first floor of stone. Under this is the cistern, which may be a bath or anything else. The first story arches on three sides; the back or western side being close because the hill there comes down, and also to carry up stairs on the outside. The second story to have a door on one side, a spacious window in each of the other sides. The rooms each eight feet cube; with a small table and a couple of chairs. The roof may be Chinese, Grecian, or in the taste of the Lantern of Demosthenes at Athens." [1]

Adjuncts so luxurious would hardly be elaborated until the mansion itself had received attention, especially in view of Jefferson's approaching marriage. It seems probable that the plans for the house were already well determined before Jefferson's first removal to the mountain. The placing of the original pavilion really presupposes, in the case of Monticello, the fixing of the general scheme. Moreover, the brief visits which Jefferson made to the estate between the middle of March, 1771, and his marriage on New Year's day, 1772 [2] would scarcely have sufficed for making the studies of his we have which must have preceded any considerable work on the main house.

It was doubtless to secure some one to supervise and execute these plans that he wrote on June 1, 1771, to Thomas Adams, a business corre-

[1] See full text in Randall, vol. i, pp. 60–61. The original is in the library of the Massachusetts Historical Society.

[2] Itinerary in P. L. Ford's edition of Jefferson's writings, 1892, vol. i, pp. xl–xli.

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spondent at tidewater, " I desired the favor of you to procure me an architect. I must repeat the request earnestly, and that you will send him as soon as you can." (Bergh, vol. iv, p. 236.) This was the time before there were architects, properly speaking, in America; — men such as Hoban, Thornton and Latrobe did not come to this country till the last decade of the century. In American parlance of the day, as long afterwards, " architect " meant a master builder. As late as 1801 William Perry, in his Royal Standard English Dictionary (Brookfield, Massachusetts) largely copied from an abridgement of Johnson, went out of his way to change the definition of architect from " a professor of the art of building; a surveyor, a designer " to " a chief builder, designer, and surveyor of buildings " — a difference of emphasis that must have been still more pronounced in 1771.

Randall states that the southeast pavilion was " the house and home " to which Jefferson brought his bride on January 25, 1772, at the close of their honeymoon. If this is true, the inference is that the main house had not progressed as Jefferson hoped, and was still unfit for occupancy. It is safe to assume, however, that it was not long before a part of it, at least, was habitable.

In December, 1774, Jefferson was expecting some window sashes and glass from England,[1] which the agreement against importation threatened to exclude. On April 17, 1775, according to two dates in the first of the " measuring-books," as they were called, containing calculations for the work, he was checking over the figures for the ground story preparatory to refiguring an Ionic order — eighteen feet in total height — which, it seems, was to be superposed on the Doric order below.

After his governorship, from June, 1781, to December, 1782, he was almost continuously at Monticello. It was during this period, in the spring of 1782, that he was visited by de Chastellux who gives in his Travels the earliest description of the house. It has been frequently cited, without full appreciation of the differences it indicates between the house as it then was and the house as it stands to-day — above all in the existence of a second story and attics — differences which a study of the drawings will soon make intelligible.

" This house, of which Mr. Jefferson was the architect, and often one of the workmen, is rather elegant and in the Italian taste, though not without fault; it consists of one large square pavilion, the entrance to which is by two porticoes, ornamented with pillars. The ground floor consists chiefly of a very large lofty saloon, which is to be decorated in the antique style; above it is a library of the same form, two small wings, with only a ground floor and attic story, are joined to the pavilion, and communicate with the kitchen, offices, etc., which will form a kind of basement story, over which runs a terrace." [2]

[1] Letter to Cary and Harrison of December 9. Bergh, vol. iv, 23.
[2] Travels in North America, vol. ii, pp. 41–42. London, 1787. 2d edition.

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The death of Jefferson's wife in the fall of 1782, and his subsequent preparations for departure on a foreign mission, permit us to assume that de Chastellux's description still remained substantially true when Jefferson finally sailed in 1784.

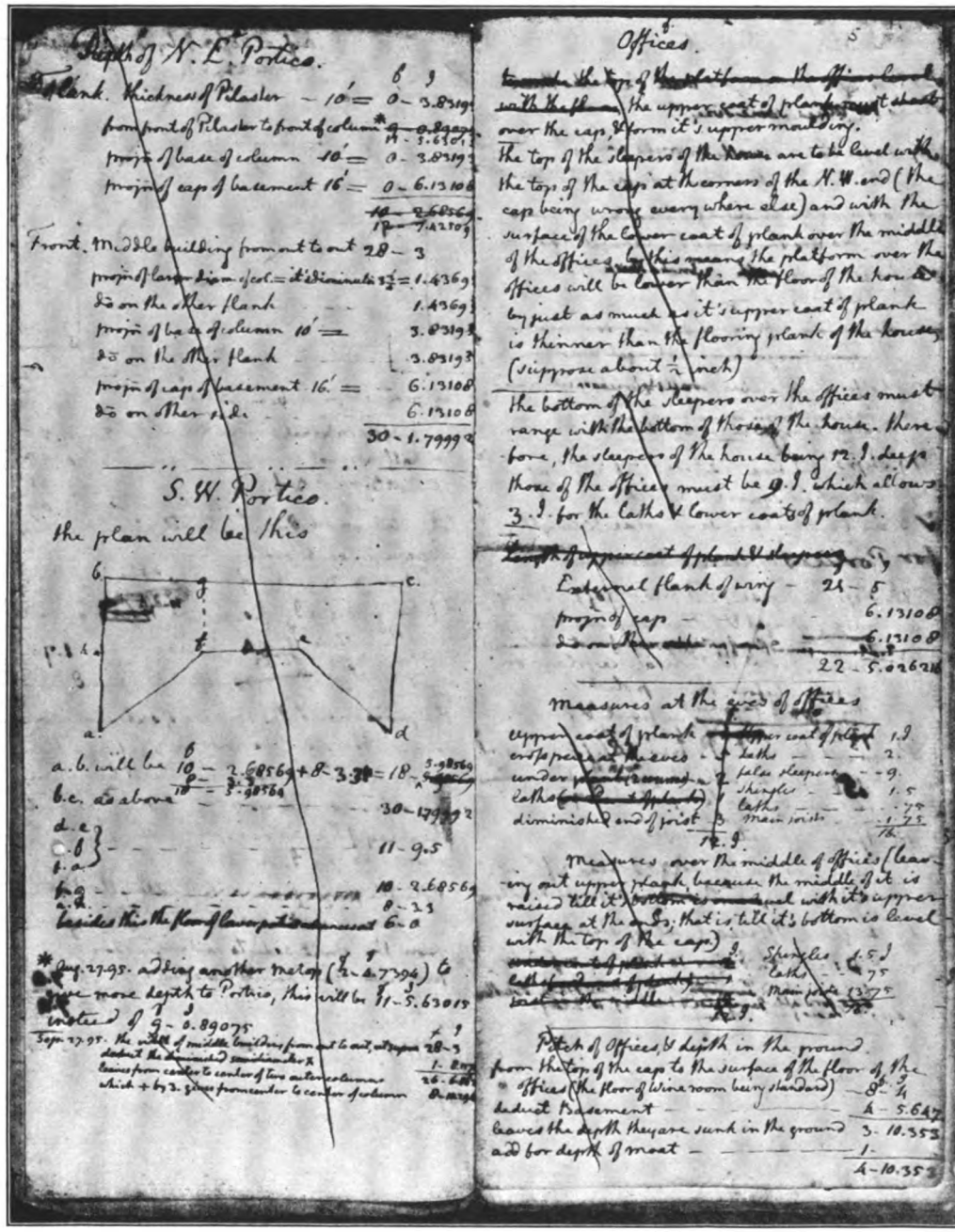


FIG. 1. PAGE FROM THE "MEASURING BOOK" CONTAINING THE CALCULATIONS FOR THE EARLIER WORK AT MONTICELLO, WITH ENTRIES, DATED 1795, WITH REFERENCE TO PROPOSED CHANGES.[1]

On his return from France in 1789 Jefferson was immediately named one of Washington's cabinet, and he resided in Philadelphia, with but

[1] The copyright of the facsimiles of Jefferson's drawings and memoranda is vested in the estate of T. Jefferson Coolidge, Jr.

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brief visits to Monticello, until January, 1794, after his retirement. The neglected condition of his estates then first occupied him, and the first memoranda that we find looking toward a remodelling of the house in accordance with the development of his views while abroad are from 1794–95. At the bottom of pages in the measuring-book containing the calculations for the earlier work, new entries are added with reference to proposed changes, dated as in Fig. 1. On January 1, 1796 an entirely new book is started with notes for radical modifications, including destruction of all above the ground story. On page one is a table headed "Future Demolitions," as follows:

	running		pitch		sq. ft			
N. Attic	54. f	×	7. f		378			
S. Attic	36. f	×	7. f		252		br	bricks
					630	×	18	11,340
			br					
Study	68 f	×	24	1632				
	38 f	×	30	1140				
				2772	×	8 f pitch		22,176
								35,516

In future it is suggested that the middle building have a parlor of nineteen feet pitch, and a dome of ten. On page 6 are calculations for the dome, with the note, "The model of the Dome is taken from the temple of Vesta Pall. pa. 22. Pl. 39." That the height of eight feet demolished in the study to be replaced by the dome, was not the full height to which the room had been carried is shown by further notes here, namely "the wall is to be taken down to 10 f. pitch," and "Sky room to be 10 f. pitch which retains 37 courses of bricks; there will then be 29 courses to take down; 66 courses making 18 f." Page 10, headed "Orders of Architecture" contains a list interesting, among other reasons, because mentioning for the first time the hall, the north piazza, and other features:

"The fine examples of the orders are the following:

Tuscan.	Palladio's from the arena of Verona	Errard pl 45	bedrooms
Doric.	without mutules, Palladio	Errard pl 5	Din Room
	with mutules, the example from Albania	Errard pl 4	North Bow
	with dentils. The Thermae of Diocletian [1]	Errard pl 3	North Piazza
Ionic.	with modillions. Palladio's	Errard pl 16	Hall
	with dentils. Temple of Fortuna Virilis	Errard pl 15	Chamber
Corinth'n.	with modillions and Dentils. Palladio's	Errard pl 35	Parlour

External of the house. Doric. Pallado P. 15. 16."

[1] A line is drawn through this entry.

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On March 19, Jefferson wrote to William B. Giles, " I have begun the demolition of my house, and hope to get through its reedification in the course of the summer." (Randall, vol. ii, p. 302.)

These changes and their date are further evidenced by two descriptions of visitors during the process of remodelling that year, 1796. The account of la Rochefoucault-Liancourt, who saw Monticello in June, has been often quoted, but it will appear now with more specific meaning:

" . . . The house stands on the summit of a mountain and the taste and arts of Europe have been consulted in the formation of its plan. Mr. Jefferson had commenced its construction before the American Revolution; since that epocha his life has been constantly engaged in public affairs, and he has not been able to complete the execution of the whole extent of the project which it seems he had at first conceived. That part of the building which was finished has suffered from the suspension of the work, and Mr. Jefferson, who two years since resumed the habits and leisure of private life, is now employed in rempairing the damage occasioned by this interruption, and still more by his absence; he continues his original plan, and even improves on it, by giving to his buildings more elevation and extent. He intends that they should consist only of one story, crowned with balustrates; and a dome is to be constructed in the centre of the structure. The apartments will be large and convenient; the decoration, both outside and inside, simple, yet regular and elegant. Monticello, according to its first plan, was infinitely superior to all other houses in America, in point of taste and convenience; but at that time Mr. Jefferson had studied taste and the fine arts in books only. His travels in Europe have supplied him with models; he has appropriated them to his design; and his new plan, the execution of which is already much advanced, will be accomplished before the end of next year, and then his house will certainly deserve to be ranked with the most pleasant mansions in France and England. . . ." [1]

The description by Isaac Weld, an Irish traveller, who visited Jefferson in May of the same year, less well known, adds some confirmatory details concerning the house:

" At present it is in an unfinished state; but if carried on according to the plan laid down, it will be one of the most elegant private habitations in the United States. A large apartment is laid out for a library and museum, meant to extend the entire breadth of the house, the windows of which are to open into an extensive greenhouse and aviary. In the center is another very extensive apartment, of an octagon form, reaching from the front to the rear of the house, the large folding glass doors of which, at each end, open under a portico. An apartment like this, extending from front to back is very common in a Virginia house; it is called the saloon. . . ." [2]

[1] Travels through the United States, 2d edition, London, 1800, vol. iii, p. 137–138.
[2] Travels through the States of North America, 1800. Letter xv.

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The remodelling was destined to take longer than had been expected. Work for 1796 was brought to a close by a severe frost. On November 28, Jefferson writes to his son-in-law, Thomas Mann Randolph, " My works are arrested in a state entirely unfinished, and I fear we shall not be able to resume them." [1] The next spring Jefferson became Vice-President, and once more began to be absent from home for lengthy periods. The work seems to have dragged on till well into his presidential term.

A series of family letters given in Miss Randolph's book throws interesting light on the intimate rôle Jefferson himself played in the building, as well as the pace at which it was carried on: OnF ebruary 8, 1798, Jefferson writes from Philadelphia to his daughter, Mrs. Randolph, " The south pavilion, the parlour, and study will accommodate your family " (p. 249). The presumption is, as no one else was there at the time, that the other portions were unfinished. On July 13 he writes Mrs. Eppes, " I arrived here on the 3d instant . . . (To have gone to you) would also have stopped my workmen here, who cannot proceed an hour without me, and I am anxious to provide a cover which may enable me to have my family and friends about me " (p. 251). Again from Philadelphia, January 1, 1799, " I hope I shall, on my return, find such preparations made as will enable me rapidly to get one room after another prepared for the occupation of our friends . . . " (p. 255), and from Monticello, March 8th, " Scarce a stroke has been done towards covering the house since I went away, so that it has remained open at the north end another winter. It seems as if I should never get it inhabitable " (p. 257). The house was still unfinished when Mr. Jefferson returned there on a visit early in April, 1801. He writes, April 11th, to Mrs. Eppes, " Let me know . . . when you will be here, that I may accommodate to that my orders as to executing the interior work of the different parts of the house " (p. 278). An " Analysis of expenditures from Mar. 4, 1801 to Mar. 4, 1802 " contains the entry, ' Building (at Monticello), $2,076." (Randall, vol. iii, p. 21.)

Subsequent progress on the buildings and grounds can be traced by unpublished letters and memoranda at the Library of the Massachusetts Historical Society. A letter from George Divers shows that in the summer of 1803 there were still rooms to be plastered. Sheet iron for the top of the house, Jefferson's favorite roofing material, was ordered early in the year and delivered before its close. September 4, 1804, one hundred sheets were ordered for the north offices, and as late as the fall of 1805 another hundred were ordered for delivery the following spring.

The further development of the estate lay in the gardens and in the facilities for manufacturing. The nailery had been established in 1795, the Rivanna canal for navigation and power, with its buildings was the work of 1803. On September 20th of that year Jefferson writes from Monticello to Mr. Walker, millwright, " The walls of my toll mill will be finished in a fortnight, and the mason, Mr. Hope, wishes immediately to

[1] " The Jefferson Papers," Mass. Hist. Soc. Collections, 1900, p. 55.

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begin the manufacturing mill. . . . A person has undertaken to have the sawmill built himself. . . . "

Although the essential parts of the dwelling were completed before Jefferson's retirement from the Presidency, the measuring books testify that it still remained in minor ways, as his biographer Raynor puts it, in a state of almost constant reedification, " And so I hope it will remain during my life," Jefferson is quoted as saying to a visitor, " as architecture is my delight, and putting up and pulling down, one of my favorite amusements." [1]

The best description of Monticello as Jefferson left it is the one published in Miss Randolph's book in 1871, prepared for her " by a member of Mr. Jefferson's family who lived there for many years." The present tense is used in it without any mention of changes since his death, and the plain implication is that the buildings remained essentially as in his day.

" The mansion, externally, is of the Doric order of Grecian (Roman) architecture, with its heavy cornice and massive balustrades, and its public rooms finished in the Ionic. The front hall of entrance recedes six feet within the front wall of the building, covered by a portico the width of the recess, projecting twenty-five feet, and the height of the house, with stone pillars and steps. The hall is also the height of the house. From about midway of this room, passages lead off to either extremity of the building. The rooms at the extremity of these passages terminate in octagonal projections, leaving a recess of three equal sides, into which the passages enter; piazzas the width of this recess, projecting six feet beyond, their roofs the height of the house, and resting on brick arches, cover the recesses. The northern one connects the house with the public terrace, while the southern is sashed in for a green-house. To the east of these passages, on both sides of the hall, are lodging-rooms. This front is one-and-a-half stories. The west front the rooms occupy the whole height, making the house one story, except the parlor or central room, which is surmounted by an octagonal story, with a dome or spherical roof. This was designed for a billiard-room; but, before completion, a law was passed prohibiting public and private billiard-tables in the State. It was to have been approached by stairways connected with a gallery at the inner extremity of the hall, which itself forms the communication between the lodging-rooms on either side above. The use designed for the room being prohibited, these stairways were never erected, leaving in this respect a great deficiency in the house.

" The parlor projects twenty feet beyond the body of the house, covered by a portico one story, and surmounted by the billiard-room. The original plan of the projection was square; but when the cellar was built up to the floor above, the room was projected beyond the square by three sides of an octagon, leaving a place beyond the cellar-wall not excavated, and

[1] Sketches of the Life, Writings, and Opinions of Thomas Jefferson, 1832, p. 524.

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it was in this place that the faithful Caesar and Martin concealed their master's plate when the British visited Monticello . . . (pp. 332–335).

"The top of the mountain has been levelled by art. This space is six hundred by two hundred feet, circular at each end. The mountain slopes gently on every side from this lawn; one hundred feet from the eastern end stands the mansion. Its projecting porticoes, east and west, with the width of the house, occupy one hundred feet each way. It approaches on either hand within fifty feet of the brow of the mountain, with which it is connected by covered ways ten feet wide, whose floors are level with the cellars, and whose flat roofs, forming promenades, are nearly level with the first floor of the dwelling. These, turning at right angles at the brow, and widening to twenty feet, extend one hundred feet, and terminate in one-story pavilions twenty feet square, the space beneath these terraces forming basement offices." (p. 336.)

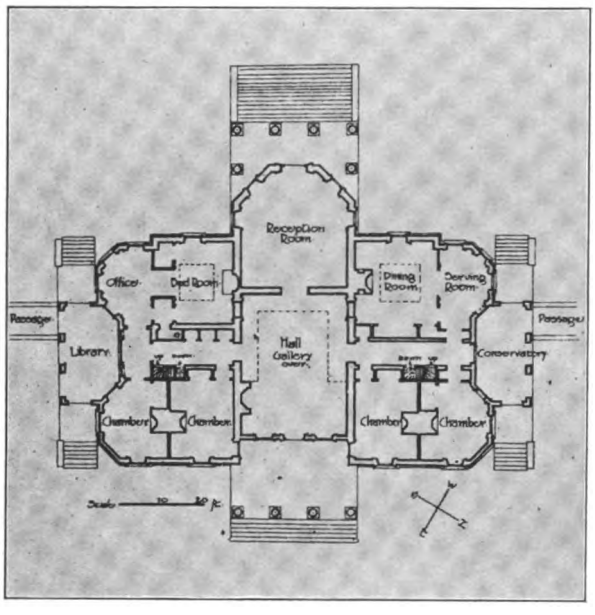


FIG. 2. PLAN OF THE FIRST STORY, MONTICELLO, FROM "THE GEORGIAN PERIOD," 1902

The account of B. J. Lossing in 1853 [1] — vague concerning the architecture, to be sure — likewise tells nothing of any changes in the house itself. Even to-day the main building, at least, still corresponds almost exactly to the description quoted by Miss Randolph. A measured plan and elevation, made about 1900 from the drawings of Mr. Theodore H. Skinner [2] are shown in Figures 2 and 3.

A personal examination on the site reveals several changes of modern date in the dependencies. The northern wing of the basement offices, mentioned in Miss Randolph's book, has partly disappeared only the portion opposite the house and the end pavilion remaining. The present manager of the estate, Mr. Rodes, states that the debris of this had already been removed before his term began, over twenty-five years ago. The old doors of the pavilions which opened to the roofs of the offices have been in his day transformed into windows, and new doors with simple porticoes

[1] Monticello. In Harper's New Monthly, vol. vii, pp. 145–153.

[2] "The Georgian Period," Part ix, pls. 9 and 11. It will be noted that the legends of the rooms in the plan represent the present uses and do not all correspond with the uses given in Miss Randolph's book. Furthur drawings, and an old photograph showing the aviary, are also given in "The Georgian period," Plates 8, 10, and 11. The best assemblage of photographs of the house is in "Thomas Jefferson as an Architect and a Designer of Landscapes," by W. A. Lambeth and W. H. Manning, Boston, 1913. The plan given there, however, is inaccurate in several particulars.

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have been opened to the lawn between. Several evidences for further changes of plan in Jefferson's own day, such as those of which La Rochefoucauld speaks, can be discovered by close scrutiny. Dr. Lambeth has stated (p. 12) that the octagonal projection of the salon mentioned in Miss Randolph's book is the only important modification in the foundation plan, but he has overlooked a change in the opposite side. Here two round windows, in brick walls corresponding to the external walls of the basement, are now left within the house. They would indicate that the house had once been but half as thick, with a projection to the east (in the flanks of which these windows occur) corresponding to the projection of the salon on the west. It is difficult to examine the walls of the superstructure completely because of the thick growth of ivy, especially in the reentrant angles, but it seems certain that there are unbounded joints

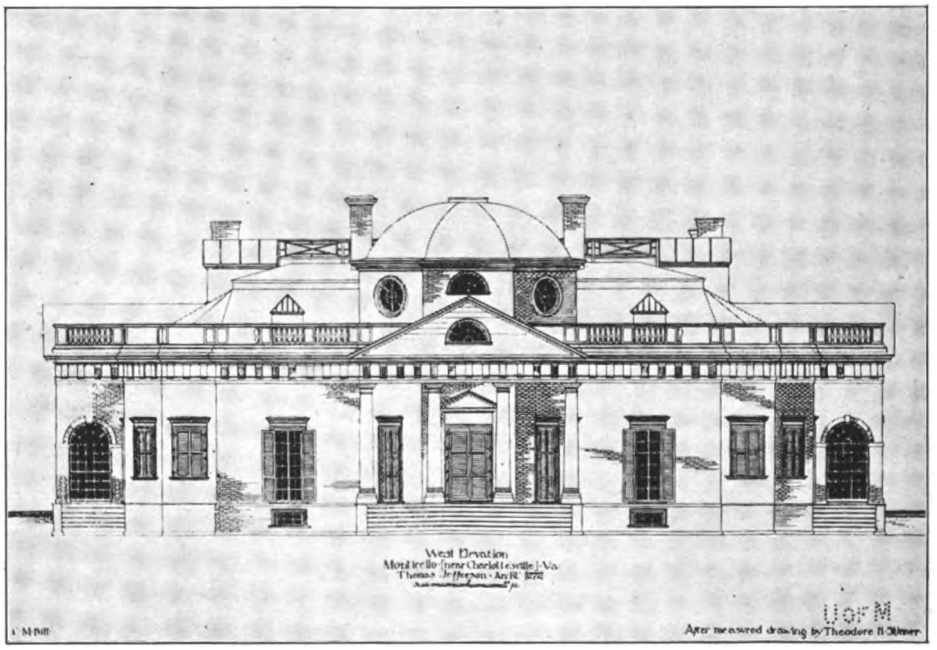


FIG. 3. WEST ELEVATION OF MONTICELLO, FROM "THE GEORGIAN PERIOD"

at the junction of the two end bay windows on the western side with the end walls of the main block, as well as between the bays themselves and the piazzas indicating differences in the time of construction.

With the data thus assembled it should now be possible to recognize many drawings as referring to Monticello, and we are warranted in arranging them in a chronological series which shall retrace and confirm the historical development previously indicated, at the same time filling out the account with details of the architecture.

The plan "D," given in Fig. 4, so similar to the present state, obviously shows the plan of the house proposed at the time of remodelling, and seen by La Rochefoucauld-Liancourt. It is on the coördinate paper, engraved with brown ink, which is used for many other of Jefferson's later projects, none of them datable before his return from France. The note

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concerning the height of the joist holes, " from the 45th and 47th courses " of the piazzas, shows that the walls of these were already built, but that the ceiling beams were not yet in. The plan can thus be assigned to the autumn of 1796, or soon after. The few points of difference from the

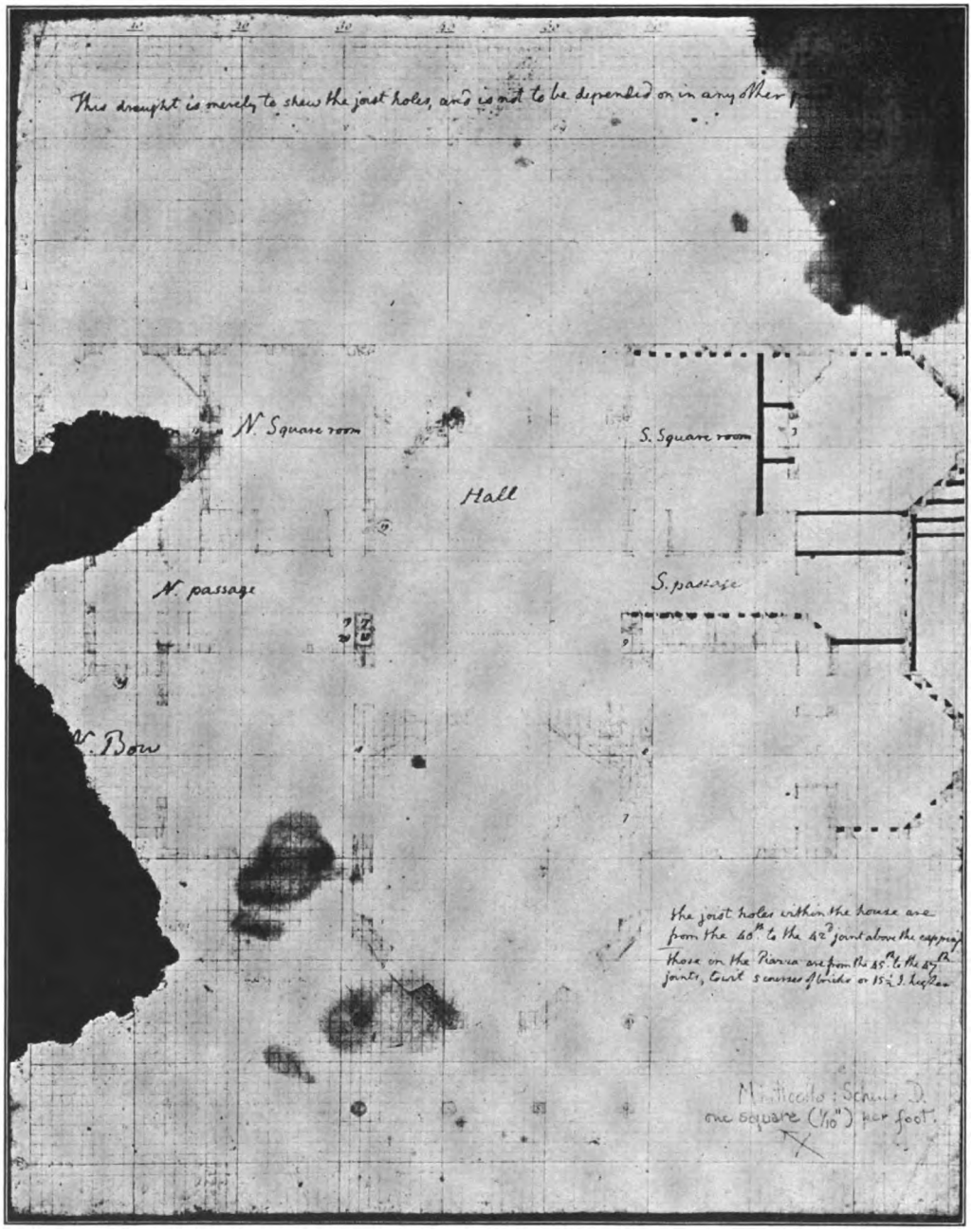


FIG. 4. PLAN OF THE FIRST STORY, MONTICELLO, FOR THE REMODELLING BEGUN IN 1796. " SCHEME D "

existing building seemingly arise not from later changes but from failure to carry out certain proposals. Among these are the cutting off of the inner corners of the salon to make it completely octagonal, and a similar cutting in the end bed rooms on the east side.

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There is little difficulty in recognizing the plan " C " shown in Fig. 5, as the one which preceded " D," and governed the house until the remodelling in 1796. It comprises the western portion of the final house, with the dimensions identical. It is an interesting confirmation that this portion of the later plan, with exception of the south bow, is free from the joist-holes (doubtless to be repeated symmetrically to the north of the transverse axis) which evidence new construction in the eastern part. The bows, though shown in scheme C, are not mentioned by Chastellux and were among the parts of the original scheme referred to by la Rochefoucault-Liancourt as left unfinished — indeed the line separating their walls from those of the main house on the plan suggests that they were an addition, or intended to be built later.

The older plan, as might be expected, is much more homogeneous than the later plan as modified after 1795. There are none of the maladjustments natural in a remodelling, no tortuous rooms such as the later library. It is a composition on two axes only, made up entirely of large and simple elements. The axis of the main block carries entirely through, with west portico and salon as at present, but preceded directly by a recess between two stair-halls opening to the portico on the east. The axis of the wings is stopped at the walls of the main block, where doors symmetrically placed give access to the salon and stair-halls.

An erasure can clearly be seen, by which was effaced an earlier arrangement for the western portico and the adjacent wall of the salon. This would have made the salon rectangular with a projection just equal to the projection on the eastern side of the house and a portico identical with the portico there. It is this disposition in general which is preserved in the basement plan, Fig. 6. The odd fractions to which its dimensions are carried, and the inequality of the dimensions of corresponding parts, makes it evident that this was a *measured* plan made after the work was up, probably before the walls of the first story were begun. Jefferson, like a good builder, " verified the measurements at the work." We learn, as a result, that the description quoted by Miss Randolph is perfectly correct in its statement that the building had proceeded, and the basement was actually finished, before the octagonal projections were decided on.

The elevation shown in Figure 7 corresponds in every detail and dimension with the plan just discussed, and in spite of its striking differences from the house of to-day, can represent nothing other than Monticello as proposed before Jefferson's residence abroad. If de Chastellux's description be now compared with this drawing, it will be seen how perfect is their agreement, and how much light is thrown on his references to a library above the salon and to attics above the wings. The lower order is of four Doric columns, its cornice without mutules, as at present, but with Ionic columns above and the pediment above them. In the center there is thus a full second story, almost as high as the first, which is eighteen

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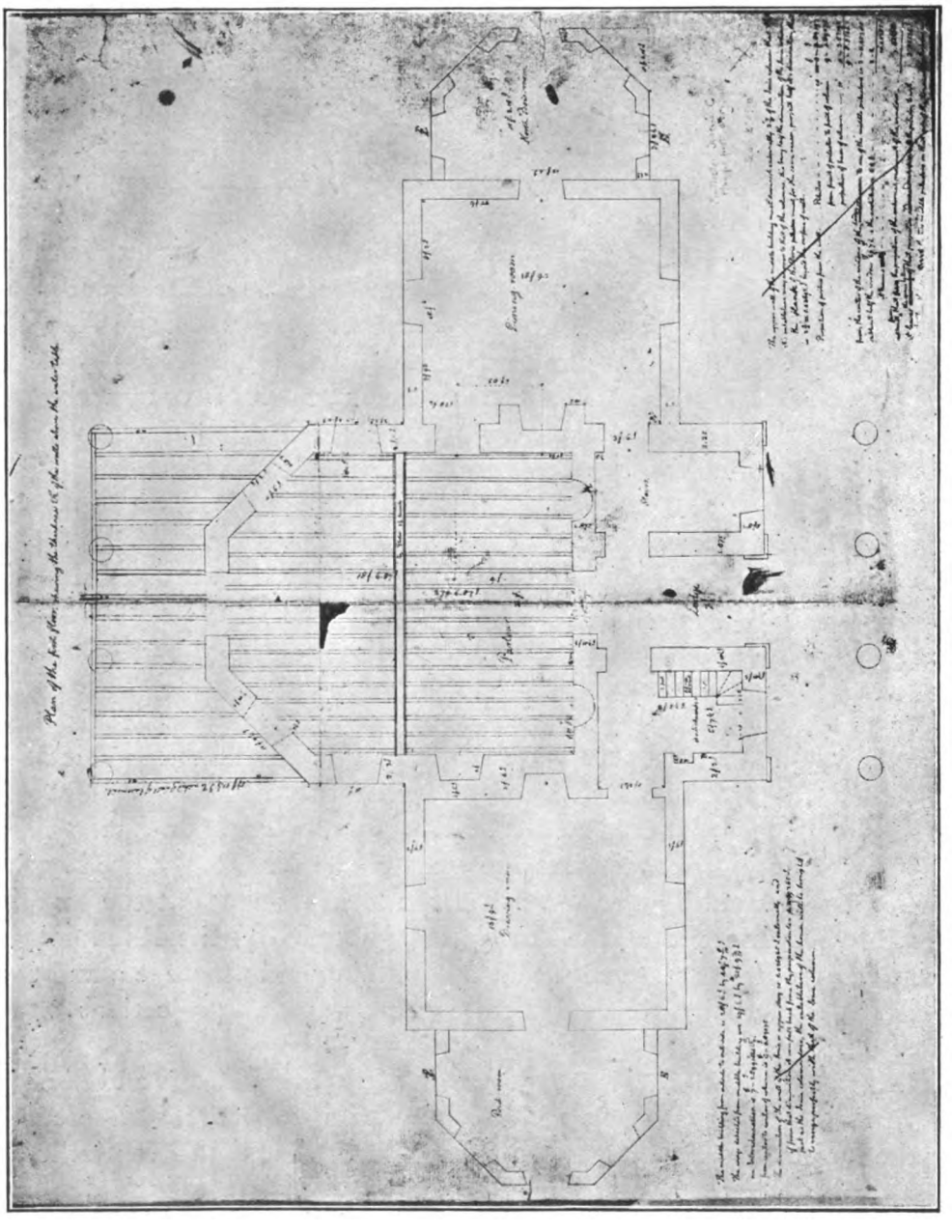


FIG. 5. PLAN OF THE FIRST STORY, MONTICELLO, FOR THE ORIGINAL BUILDING BEGUN IN 1771. "SCHEME C"

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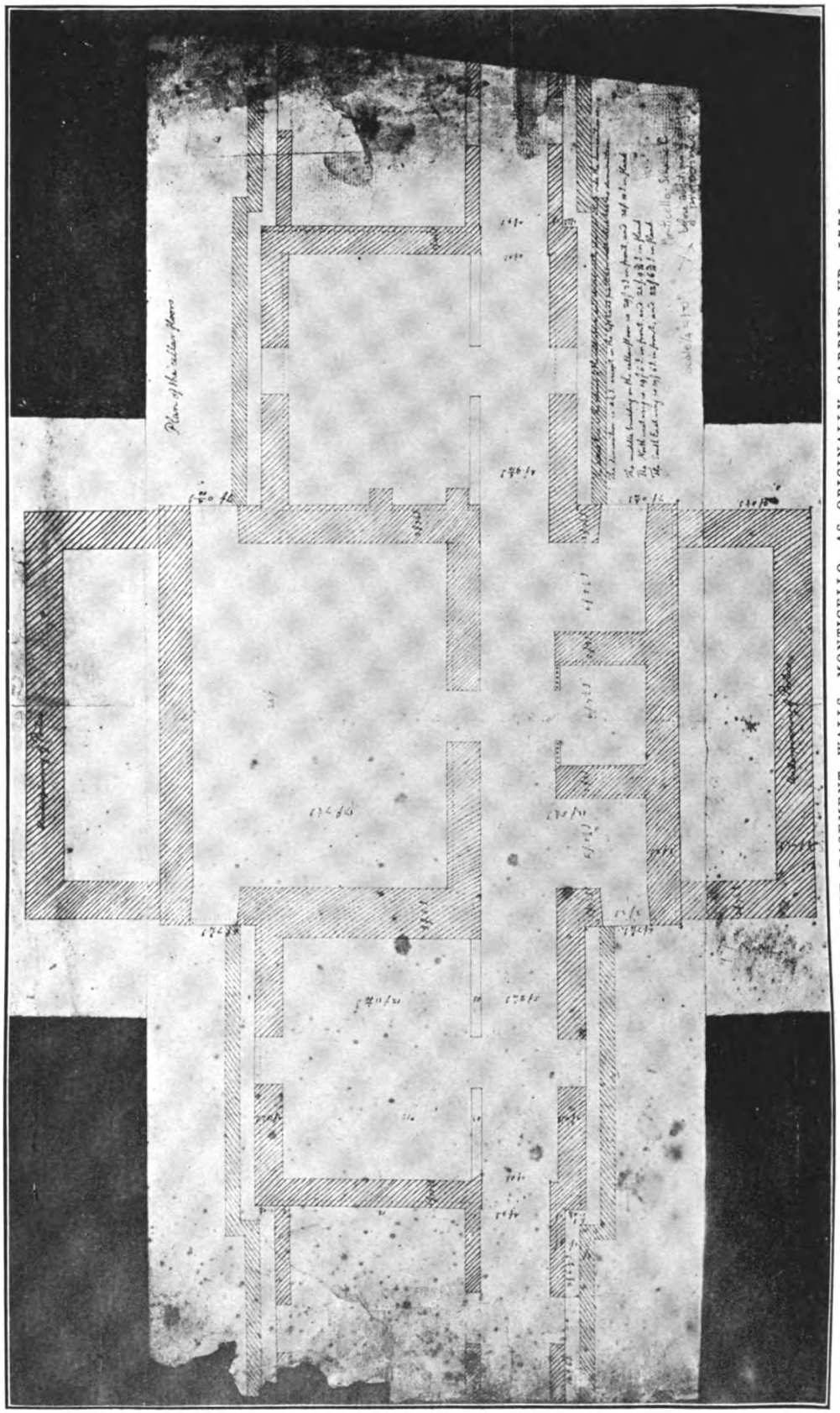


FIG. 6. MEASURED PLAN OF THE BASEMENT WALLS, MONTICELLO, AS ORIGINALLY CARRIED UP, 1771

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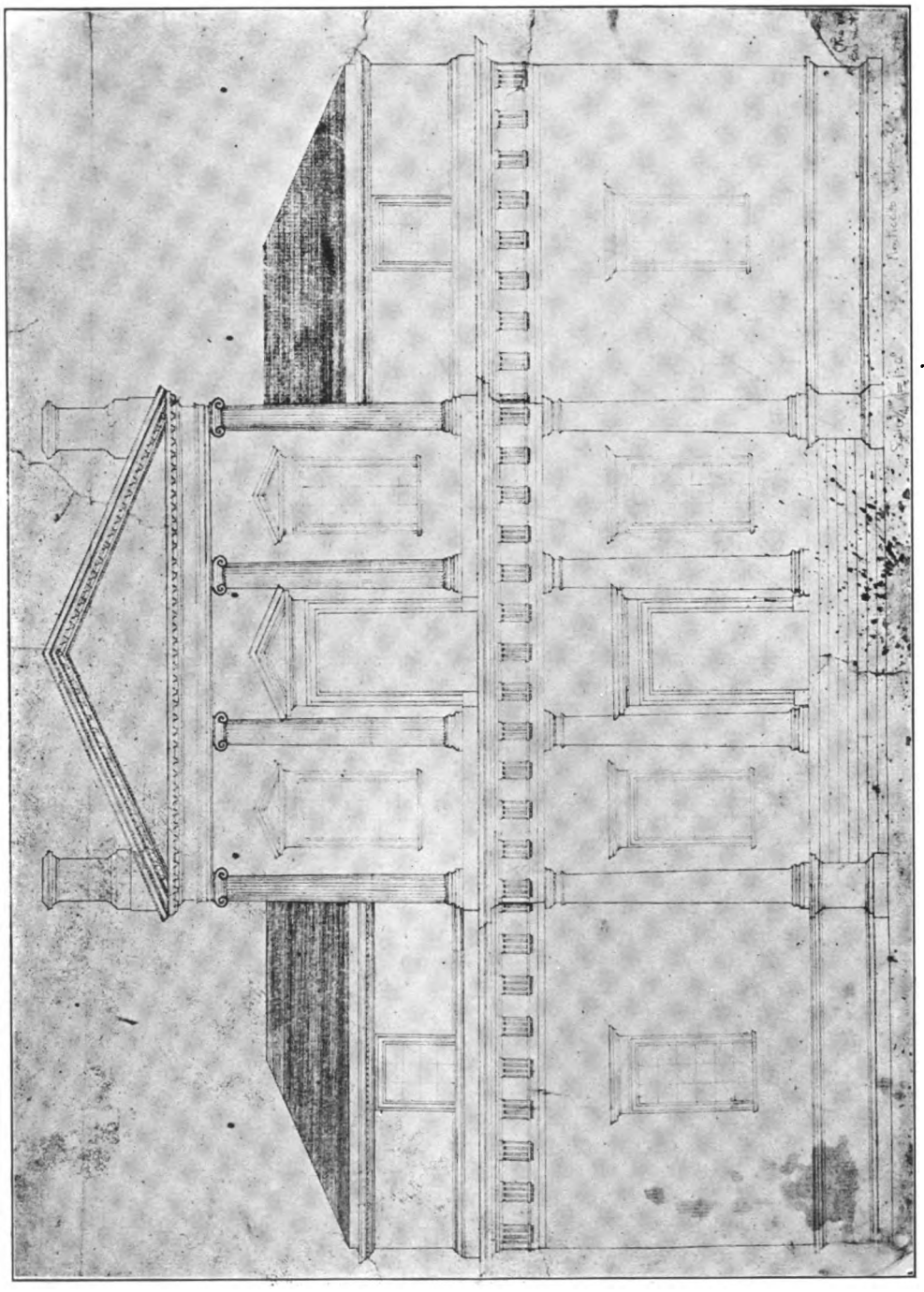


FIG. 7. ELEVATION OF MONTICELLO AS PROPOSED BEFORE JEFFERSON'S RESIDENCE ABROAD

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feet from floor to floor. Even the attic over the wings is seven feet from floor to eaves. The forms of capitals, cornices and architraves are all strictly academic. As the working drawings of the house, this elevation and the corresponding plan, in its original state, were probably completed as already suggested, by June, 1771.

The plan shown in Fig. 8 is evidently an earlier study towards scheme C, prior to the first-floor plan already studied, and of course prior to the adoption of the bows and the projecting salon. The main dimensions are the same, but the door and window openings are wider, and in general the indication shows less technical insight. It may safely be assumed

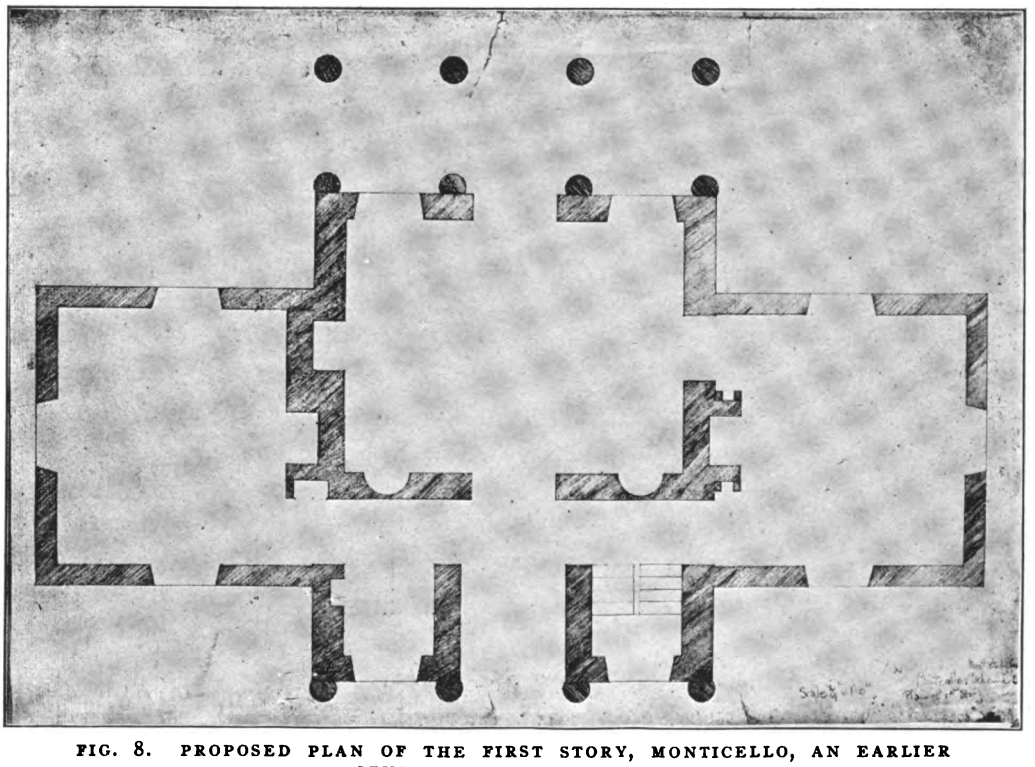


FIG. 8. PROPOSED PLAN OF THE FIRST STORY, MONTICELLO, AN EARLIER STUDY TOWARD SCHEME C

that this plan was made before any elevation was drawn, and that the final plan was one corrected as a result of study in elevation. The earlier study has engaged columns instead of pilasters for the responds of the portico, throwing the columns farther from the building. The dimensions for the foundation of the portico in the measured basement plan, suggest that this idea was still being followed at the time of building the basement walls.

The dependencies proposed in connection with scheme C appear in more detailed plans, Figs. 9 and 10. They consist of two L-shaped blocks which are attached to the ends of the house and turn along the brow of the mountain — together forming a U, open toward the west. The kitchens, offices, stables, and rooms for house-servants are entirely on a level with the basement of the house, and receive light from areas except

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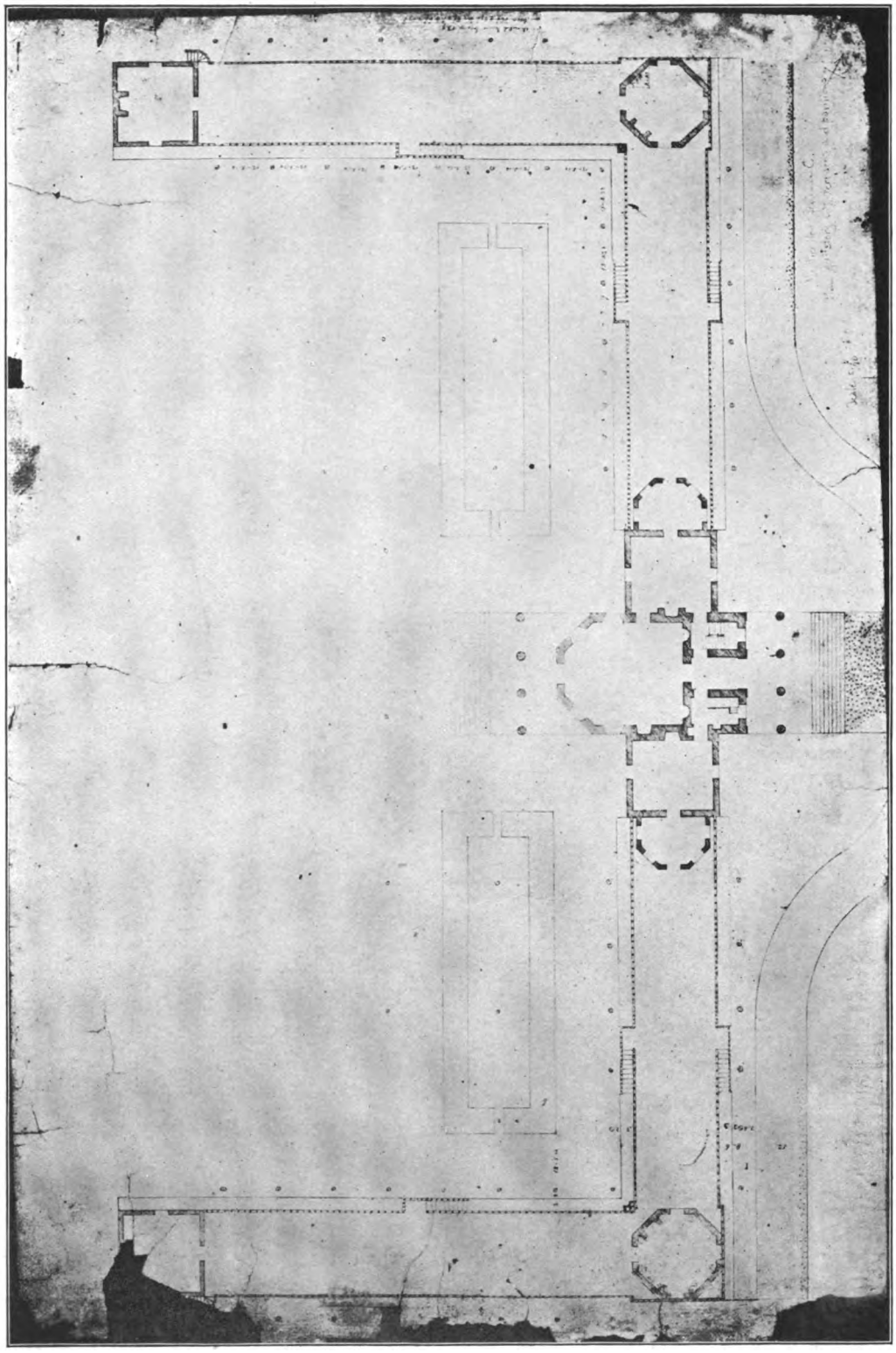


FIG. 9. PLAN OF THE DEPENDENCIES PROPOSED IN CONNECTION WITH SCHEME C, AT THE LEVEL OF THE BASEMENT OF THE HOUSE

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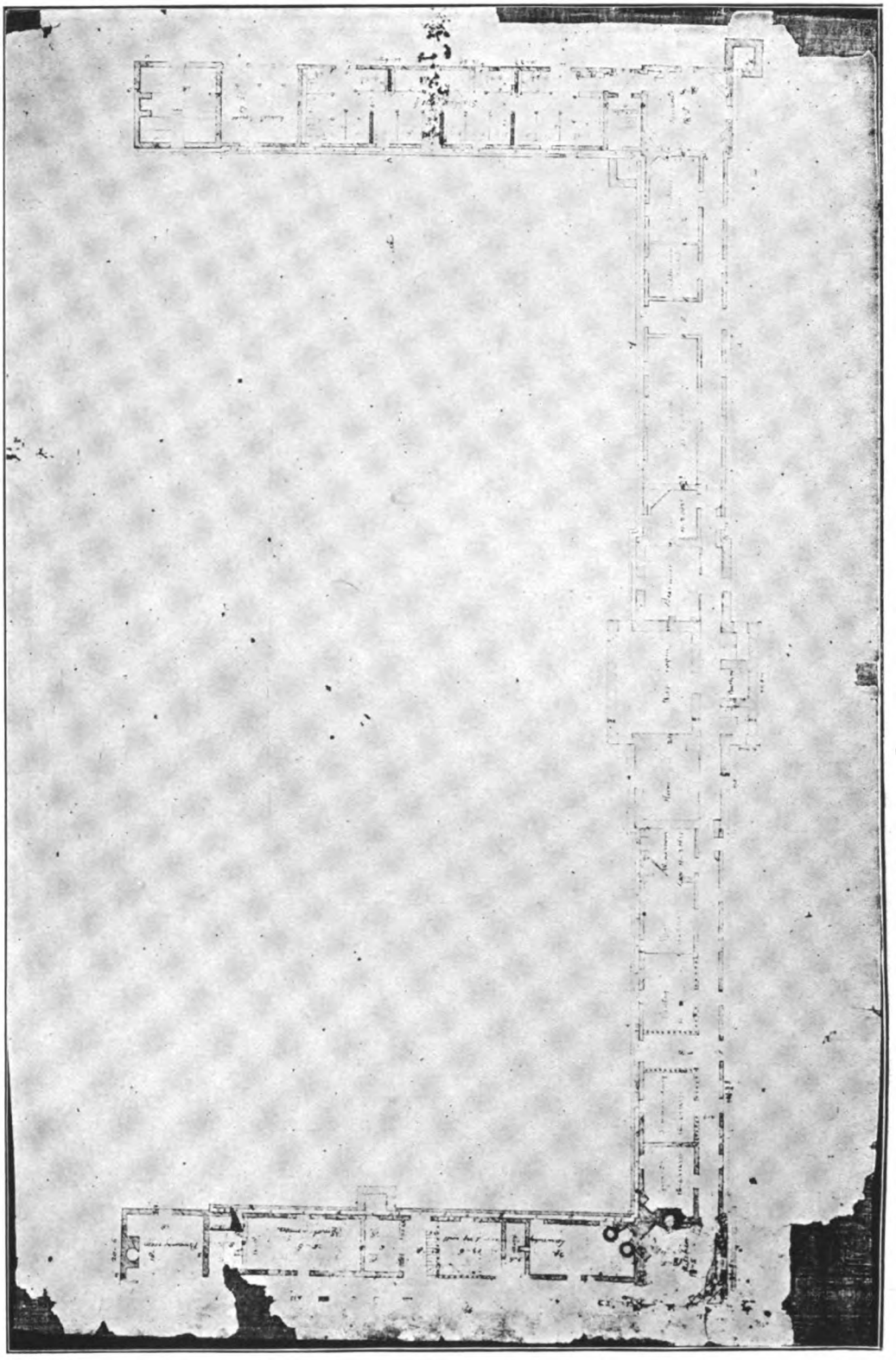


FIG. 10. PLAN OF THE HOUSE AND TERRACES AS PROPOSED IN SCHEME C, AT THE LEVEL OF THE FIRST STORY

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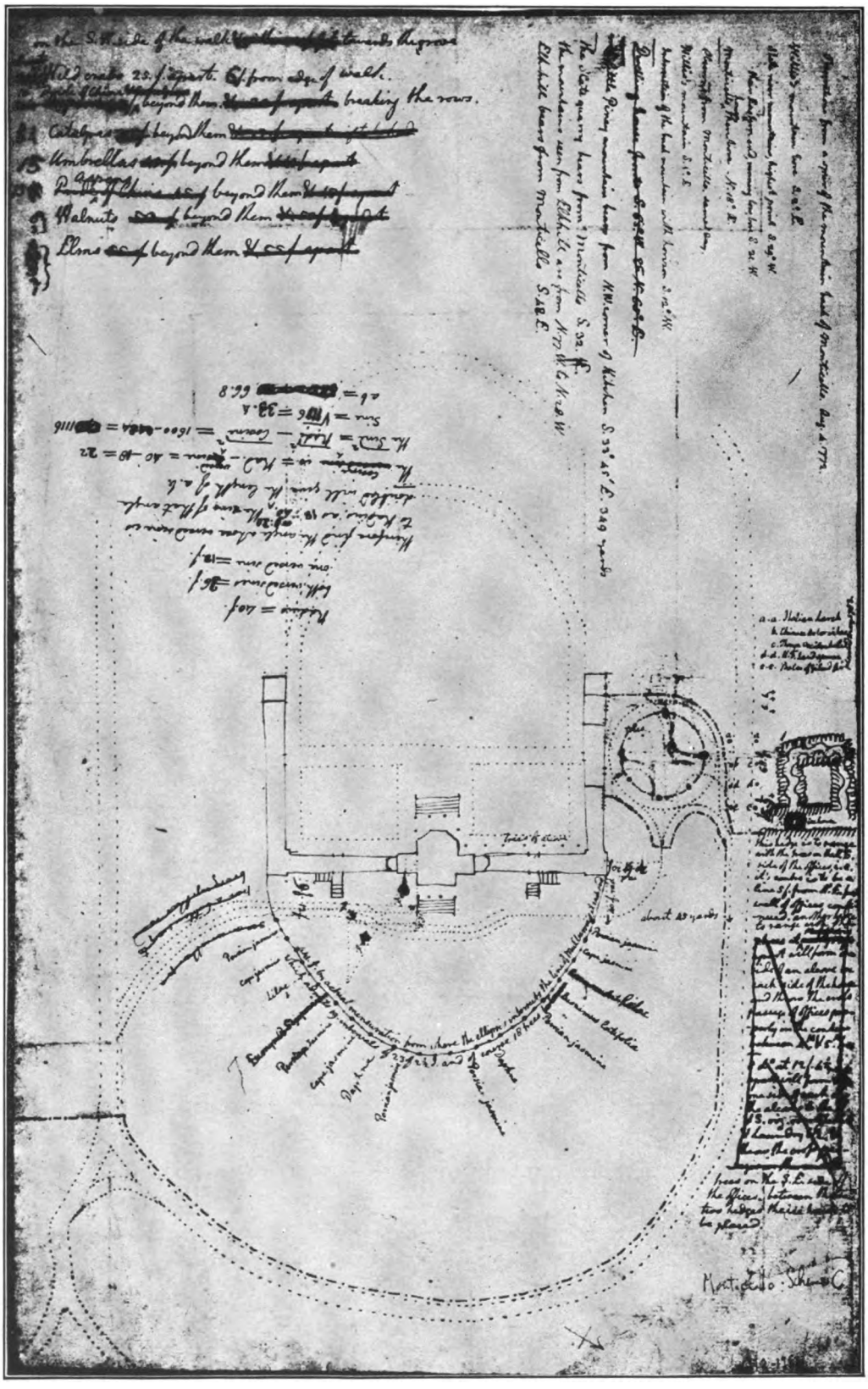


FIG. 11. PLAN OF THE HOUSE AND SURROUNDINGS AT MONTICELLO, AS PROPOSED BEFORE JEFFERSON'S RESIDENCE ABROAD, BEARING DATES 1772 AND 1783

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at the north and south, where the fall of the ground permits an arcade in place of the closed corridor elsewhere. Arcades and corridors are paralleled by a single line of rooms, the legends for which give an idea of the varied auxiliaries possible in a Virginia mansion, and of the elaborate scale of Jefferson's projects. In the southern outer wing are shown brewing room, smoke room, dairy and laundry, with the kitchen at the turn; and pantry, meat room, summer dairy and servant's hall in the link connecting with the house. In the north wing, beside stalling for twenty horses, are the corn room, the "chariot house," and the "solitude," with

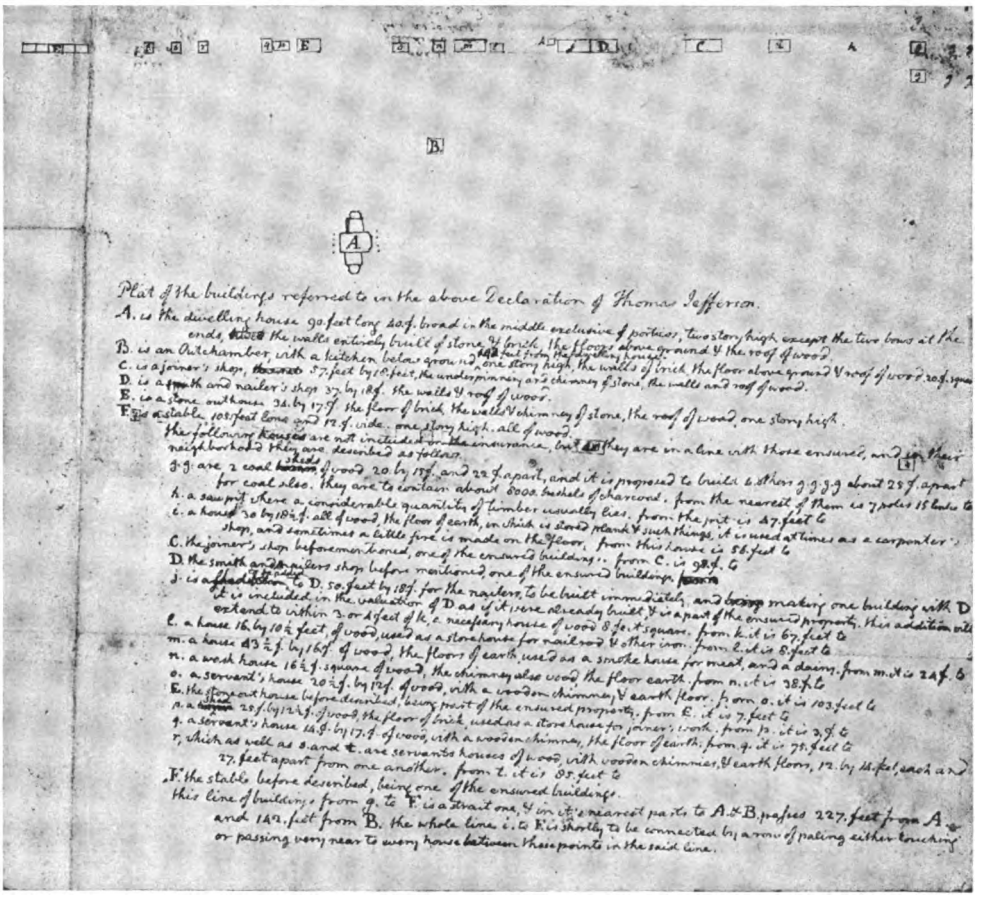


FIG. 12. PLAT AND DESCRIPTION OF JEFFERSON'S BUILDINGS AT MONTICELLO, ATTACHED TO A DECLARATION FOR ASSURANCE DATED 1796

the saddle room and the "hasterie" or roasting room, in the link. The basement of the house itself contains the buttery, beer cellar, rum cellar, and wine room. The flat roofs of all these offices form terraces level with the main floor of the house. At the extremities are the square pavilions, the southern of which was Jefferson's first room, and at the turns are the octagonal "outchambers" occasionally mentioned in his notes. There are numerous erasures which efface not only the square-ended salon, but also several alternative designs for the "outchambers," and a pair of small square projections with columns, which were replaced by the bows at the end of the house.

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The house with its dependencies according to this general scheme, with the bows, is also outlined on a plan of the whole top of the mountain, Figure 11. This is interesting as giving a *terminus ante quem* for the design of the house up to this point, through the date August 4, 1772, affixed to some observations on distant mountains evidently made for the purpose of arranging vistas. Another date on the same plan — May, 1783, when a number of trees were planted, confirms our view that the scheme could not well have been radically changed before Jefferson's departure for Europe.

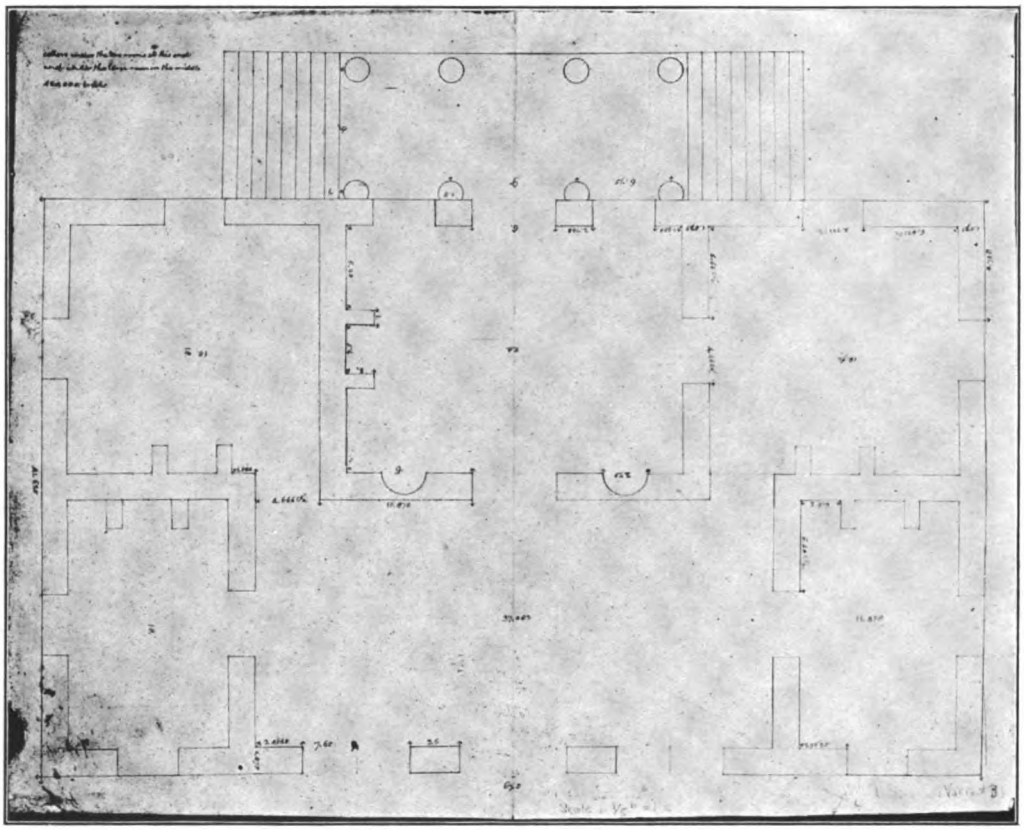


FIG. 13. REJECTED STUDY FOR THE FIRST STORY PLAN, MONTICELLO. "SCHEME B"

Many of the parts thus projected do not exist to-day, and are not mentioned in the account given by Miss Randolph. It is clear that the dependencies actually built were the outer wings at the north and south, with the square pavilions at their ends, and only the *passages* connecting with the house, the rooms along these being omitted. Even of these nothing beyond the original Southern pavilion was built before the remodelling of the house. A plat of Jefferson's buildings attached to a declaration for assurance dated 1796, shows the conditions existing at just the moment before the crucial changes, begun in that year (Fig. 12). Beside giving an idea of the varied outbuildings of the plantation, it settles that the house was then completed as outlined in the latest revision of plan C, but that the pavilion still stood completely isolated.

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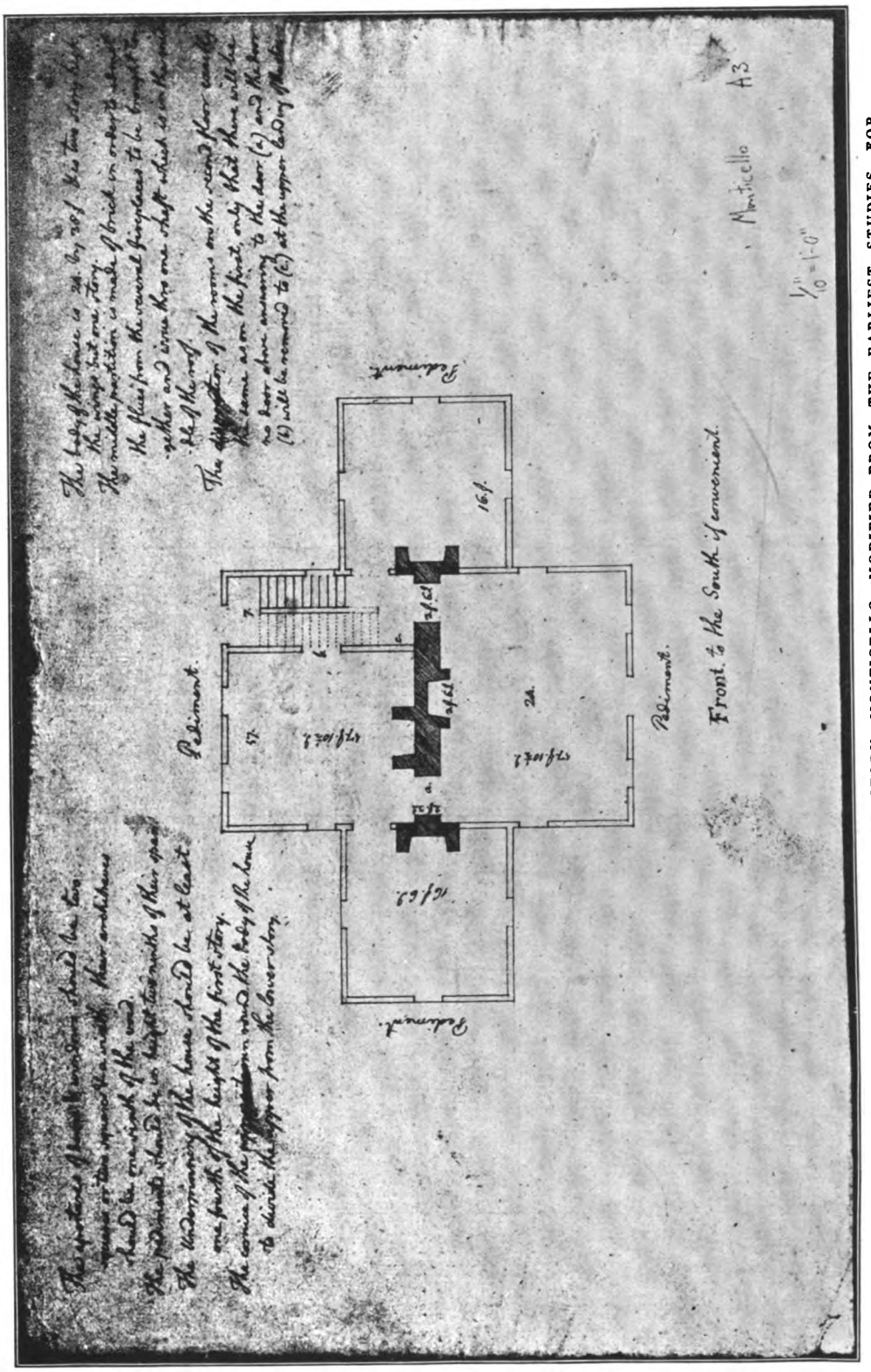


FIG. 14. PROPOSED PLAN FOR THE FIRST STORY, MONTICELLO, MODIFIED FROM THE EARLIEST STUDIES, FOR CONSTRUCTION IN WOOD. "SCHEME A"

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The working plan for the first pavilion, at quarter inch scale, is likewise preserved, but has no other features than four square walls of brick with the simplest openings.

Although no plans earlier than these seem to have been actually used in construction on the house and its dependencies, a number of earlier studies exist, which show the steps by which the final scheme was reached. A radically different variant for the house appears in "B," Fig. 13. The outside is brought into a simple rectangle, including an arched loggia on the eastern side, flanked by two rooms in addition to those of the first floor in scheme C. The principal room is identical with the original rectangular salon of C, however, and the portico next it is nearly as in C. The omission of stairs — which Jefferson, in spite of popular belief, never failed to provide elsewhere — and the greater number of rooms shown, makes it probable that no second story was intended with this scheme.

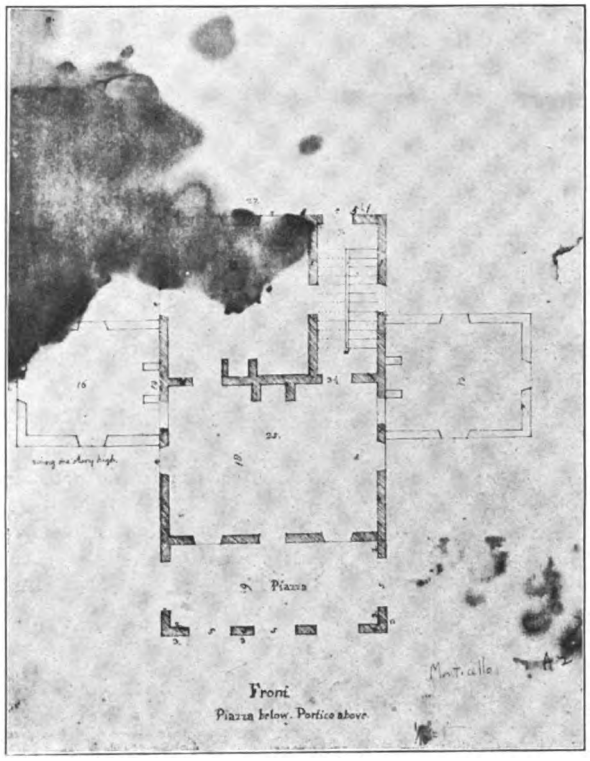


FIG. 15. PROPOSED PLAN FOR THE FIRST STORY, MONTICELLO, FOR CONSTRUCTION IN BRICK. "SCHEME A"

The plans shown in Figs. 14, 15, and 16 are obviously still earlier studies which show the germ of scheme C (Cf. Fig. 11). All have the main block and wings, with many dimensions substantially equal to those of later plans. Two evidently give variant methods of execution — one with brick walls throughout, but the wings left for later addition; the other proposing walls all of wood, with only the central group of chimneys of brick. Both lack the weight of academic apparatus which distinguished C, especially in the first study, though both indicate the employment of some classical forms. In the brick house it is a portico above the arcaded piazza in the first story; in the wooden house it is the pediments marking the four projections — their

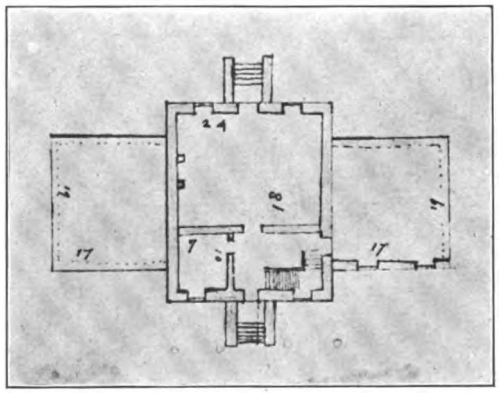


FIG. 16. RUDIMENTARY STUDY FOR SCHEME A. THE EARLIEST STUDY FOR MONTICELLO STILL PRESERVED

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proportions, with those of the openings and architraves, noted on the margins. The wooden house, with its more careful study and more exact dimensions, would seem to be the later — an instance of the age-long attempt to keep buildings within the estimates. From the legend "Front, to the South, if convenient" it may be concluded that this drawing, and consequently the preceding ones, were made before the position of the house on the mountain had been determined, prior then to the beginning of the first pavilion in the fall of 1770.

Both drawings just discussed seem later than the third and smallest, so much less developed. The stairs here are impossibly compressed, a defect seen and remedied in the succeeding plans with their long runs. In the absence of any sketch still more embryonic, this may fairly be taken as Jefferson's first study for the house at Monticello. The distance is long from this rudimentary beginning to the complex and sophisticated building which we know, and surely no one seeing only beginning and end would suspect their connection. We have found, however, by tracing the milestones still preserved in unbroken line, that they were connected by a path which is direct and unmistakable.

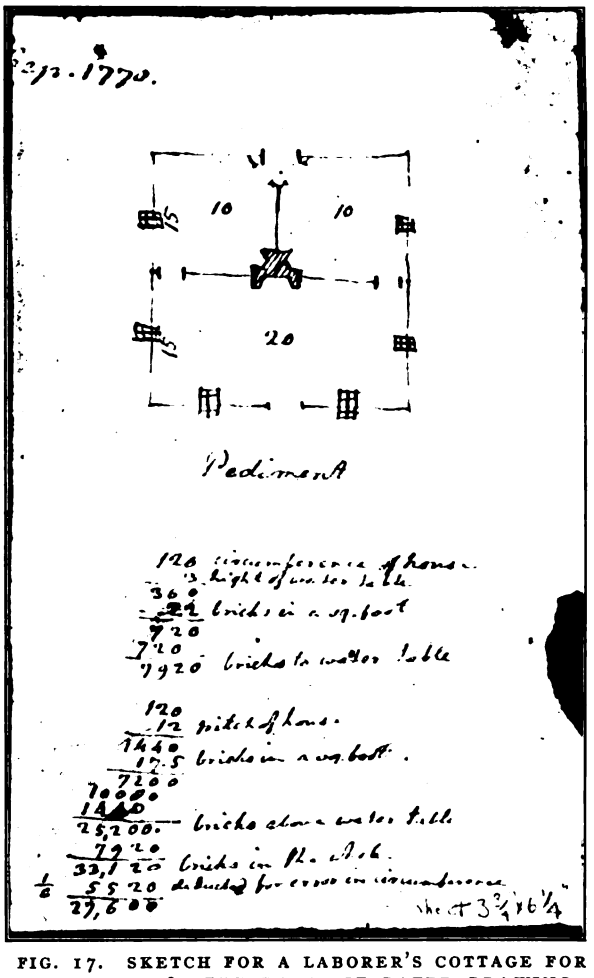


FIG. 17. SKETCH FOR A LABORER'S COTTAGE FOR MONTICELLO? THE EARLIEST DATED DRAWING BY JEFFERSON

The drawing given in Fig. 17 claims attention here through its date, "Sep. 1770." It is the earliest dated drawing of Jefferson's, and must surely refer to some portion of the Monticello estate. It was usual on Virginia estates to build the slave-quarters first, and the accounts of Jefferson's arrival with his wife in 1772 prove that this had been done at Monticello. The building shown is four-square with three rooms and a central chimney, a pediment, and consequently no upper story. The plan does not correspond to any of the cottages still preserved at Monticello, or those in ruins, and may well have been a design later abandoned. The method of indication is a primitive one, with single lines for walls and the sash laid down on the plan, but it is one to which Jefferson some-

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times recurred long after his ability as a draughtsman was established (cf. Fig. 7). In this case, however, it may indicate that he had not yet acquired his skill, for there exists a plan which seems a development of this sketch, with legends in a different hand (Fig. 18). The terms on which the work would be executed, endorsed on the back, render it probable that the plan was made by a builder to whom Jefferson had offered the work. It thus offers interesting evidence for the abilities and methods of the period, and a point of comparison for Jefferson's own later draughtsmanship.

The " outchambers " and other small decorative structures, of the kind already foreshadowed in the early proposal for a burying-ground, appear in several drawings and memoranda, though none of them seem to have been finally carried out. They fall into two groups, corresponding to the Palladian and the Roman periods of Jefferson's development. Of the first group, the domed building shown in Figure 19 is of interest owing to its beautiful draughtsmanship and to the date, August 23, 1779, in an entry on the back. There is an Ionic tetrastyle portico on the façade, a Tuscan ordonnance inside, " the form and proportions of the building being taken," so the note runs " from Jones's designs pl. 73, only that this is square." To the second group belong a series of actual models, about ten feet in diameter, of famous classic buildings — the Maison Carrée, the Pantheon, the Choragic Monument of Lysicrates, — together with a Gothic and a Chinese model. (Fig. 20.) Two entries of December 15, 1807, tell that the circular bricks necessary for the Rotunda and the Monument were at least ordered.

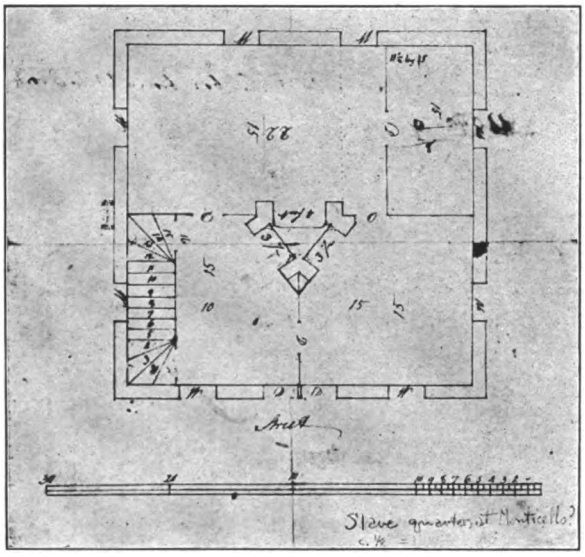


FIG. 18. BUILDER'S PLAN FOR THE LABORERS' COTTAGE SKETCH

Among the numerous scale and full-size detail drawings of Monticello which are still preserved, only the most interesting can be reproduced. Those shown in Figs. 21, 22, 23, 24, 25, and 26 evidently refer to the house as originally built; that in Fig. 27 to the remodelling after 1795. Obviously the titles, " Lower order, External," and " Upper order, External " can only belong with the scheme with porticoes in two stories. The stairs also can only belong to this scheme, the final plans of which show the risers almost exactly as in the detail. The drawings for arched doors, as a note shows, are rejected studies, which must have preceded the elevation Fig. 7, to which corresponds the detail of a square headed

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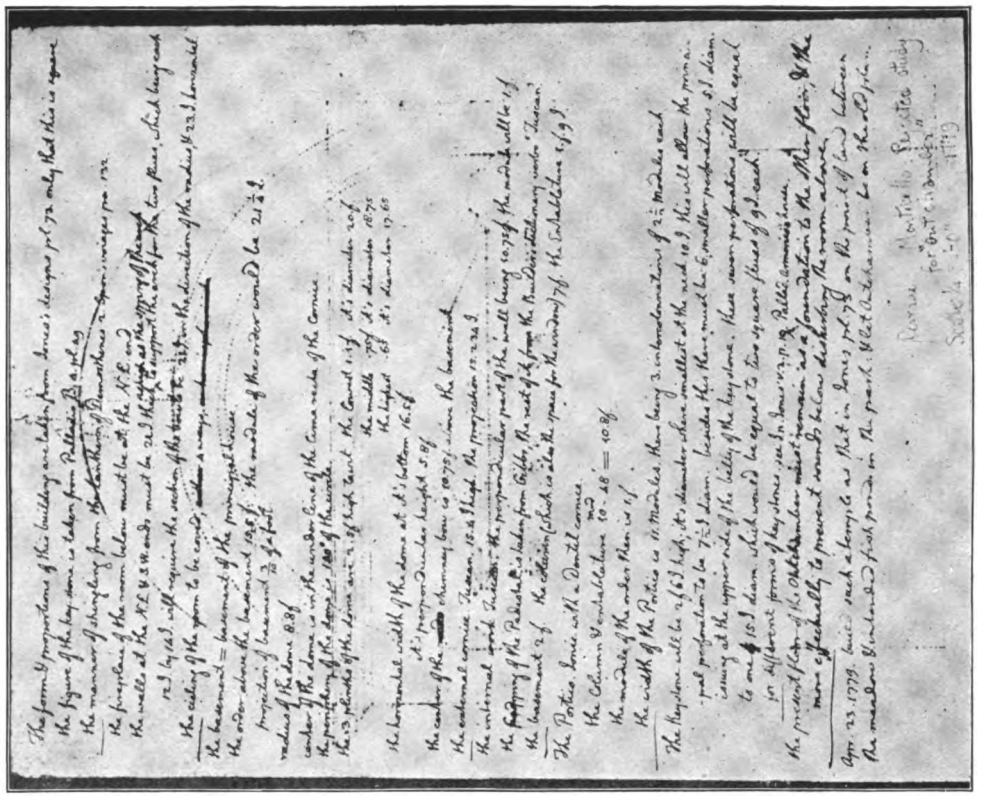


FIG. 18, A AND B. FACE AND REVERSE OF A SHEET SHOWING A DESIGN FOR ONE OF THE "OUTCHAMBERS" OF THE TERRACES PROPOSED FOR MONTICELLO

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window (marked "No. 1"). The detail of a window jamb, which so strikingly evidences Jefferson's practical interests, seems, from the notes, to have been made after the arrival of the sash in 1774–75. On the other hand the cornice of the North Bow (interior), taken, as we have

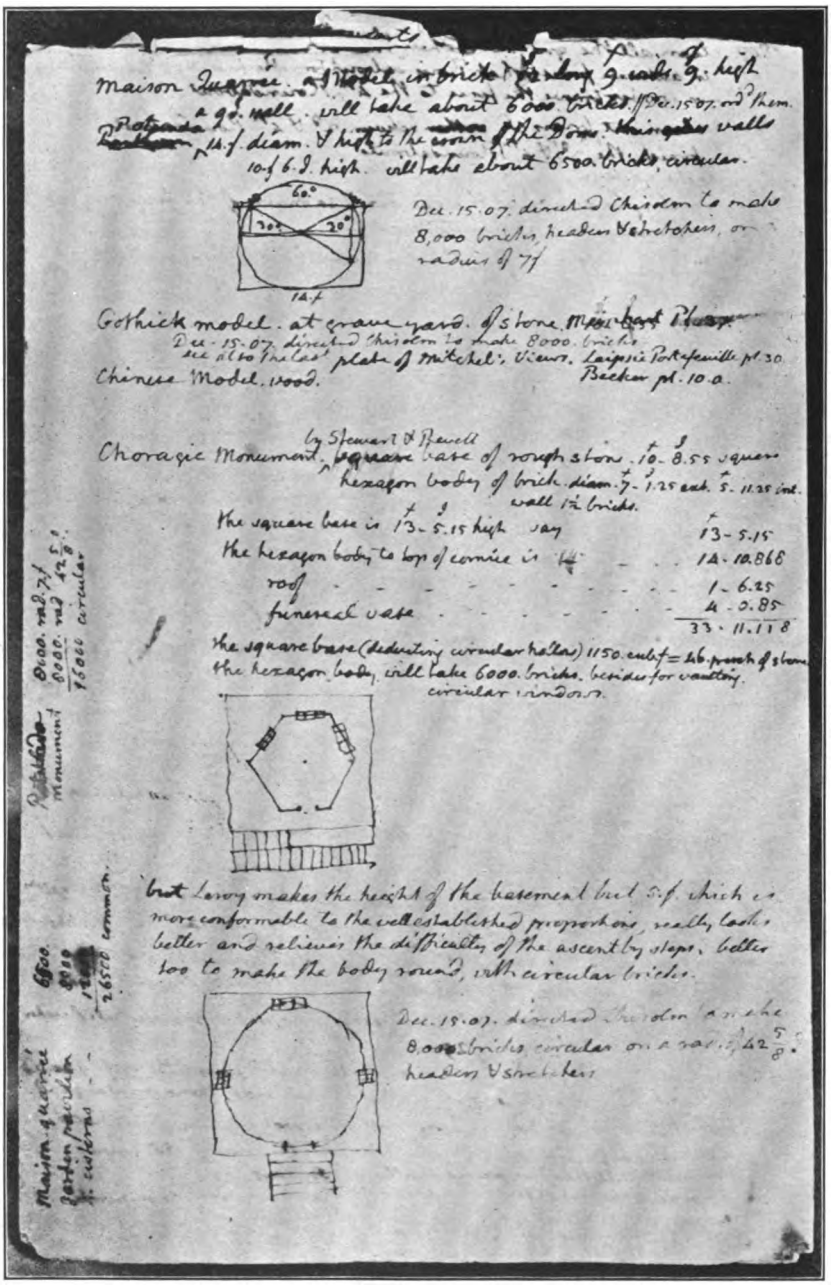


FIG. 20. SKETCHES FOR A SERIES OF GARDEN HOUSES, WITH ENTRIES OF 1807

seen, from "Errard Pl. 4," must date after the acquisition of Errard's book abroad, and confirms our opinion that the bows were not completed before Jefferson's return.

There remains to be mentioned the group of drawings reproduced in heliotype, similar among themselves, but totally different from Jefferson's

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in technique. Two of them are easily recognizable as referring to Monticello, the third belongs evidently to some other building. All doubts as to their authorship is forestalled by the signature on one of the Monti-

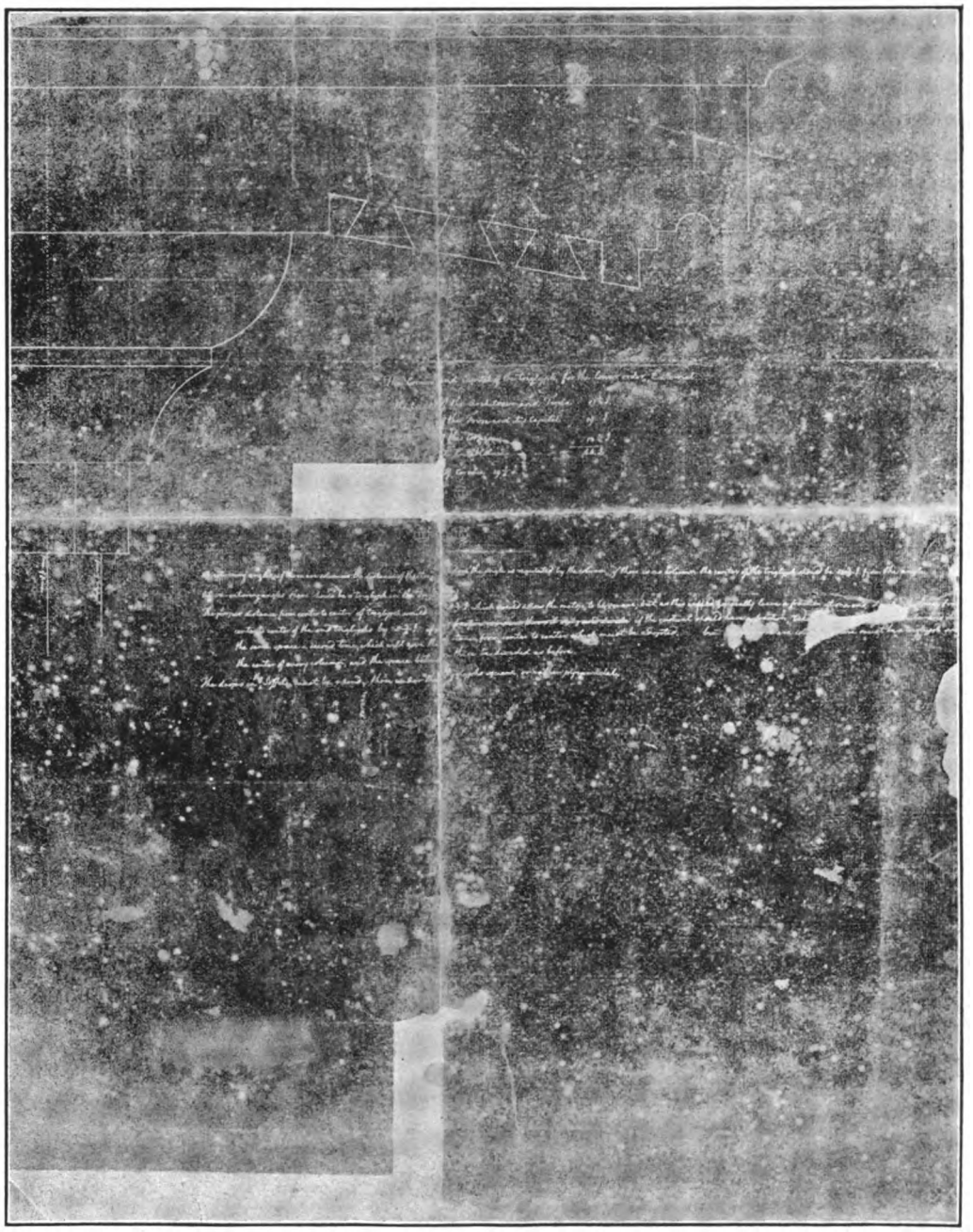


FIG. 21. DETAIL (FULL-SIZE IN THE ORIGINAL) OF THE "LOWER ORDER, EXTERNAL"

cello drawings "R. Mills" and on the third drawing, "T. Jefferson, Arch't, R. Mills, Delt. 1803."

The connection between Jefferson and Robert Mills which these drawings evidence has been the subject of misunderstanding, which may be traced to certain statements in the account of Mills by William Dunlap

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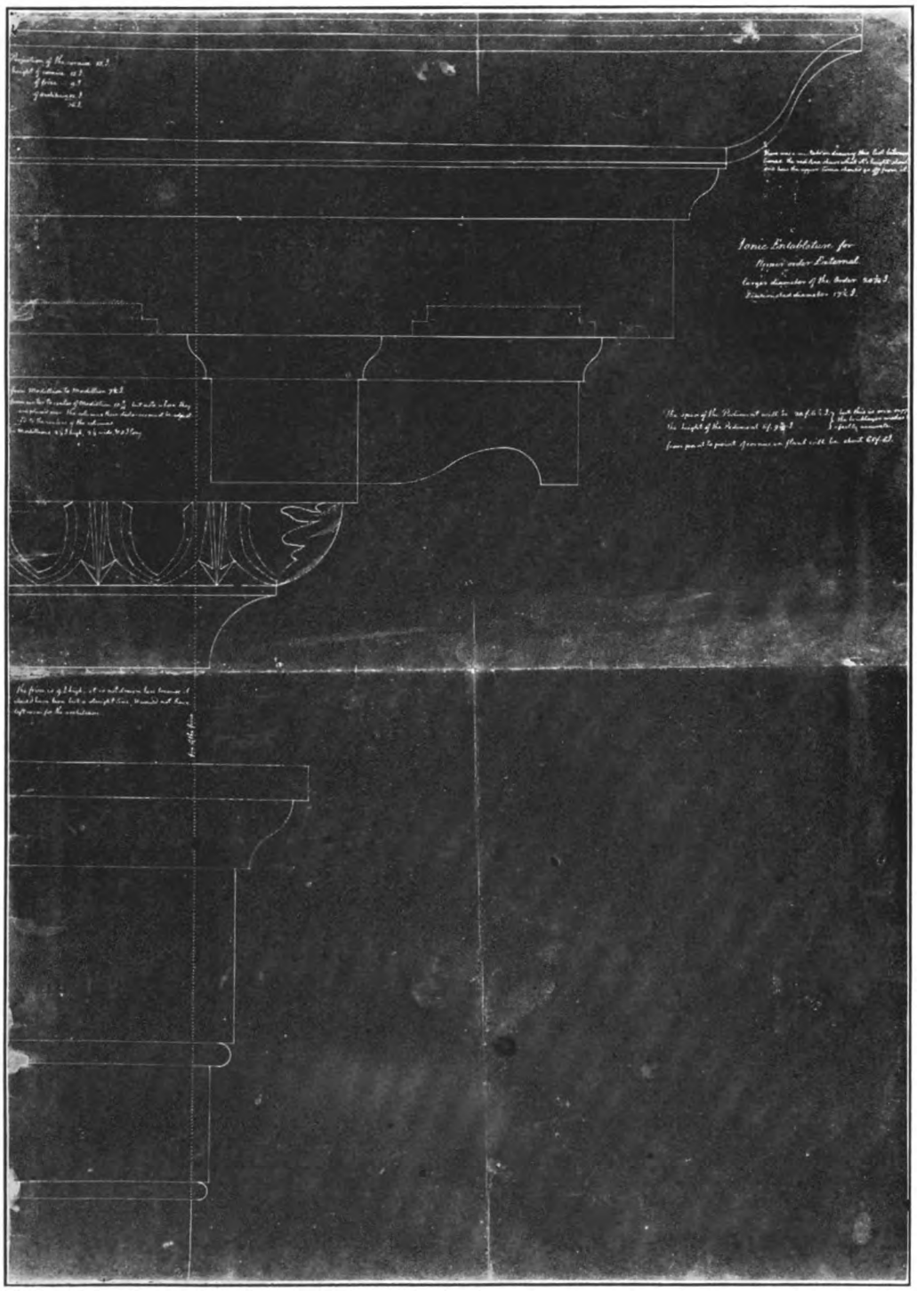


FIG. 22. FULL-SIZE DETAIL OF THE "UPPER ORDER, EXTERNAL," MONTICELLO

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in his "History . . . of the Arts of Design in the United States," 1834. As one of the earliest discussions of Jefferson's architectural activities the passage may be given at length. Dunlap states that after studying for two years, from 1800, in the office of James Hoban in Washington, and making professional visits to the principal towns of the United States, Mills was introduced to President Jefferson on his return to Washington and resumed his studies under Jefferson's patronage, "being furnished from Mr. Jefferson's library with such architectural works as he had (principally Palladio's)." "Mr. Jefferson was a great admirer of architecture, and was highly pleased to find an American directing his attention to the acquisition of this useful branch of science with a view to pursue it as a profession, and therefore gave Mr. Mills every encouragement to persevere. The president was then erecting a mansion at Monticello, which he afterwards occupied, and engaged Mr. Mills to make out the drawings of the general plan and elevation of the building; the drawings of the details Mr. Jefferson reserved to himself; and it is surprising with what minuteness he entered into these, every moulding was designated, and its dimensions, in figures, noted, so that nothing was left for the workmen to conjecture. He introduced every order of architecture in the finish of the various rooms, all true to the rules of Palladio. Mr. Jefferson was altogether Roman in his taste in architecture, and continued so to the day of his death, as may be seen by examining the University buildings in Virginia, designed by him, and carried into execution under his supervision." [1]

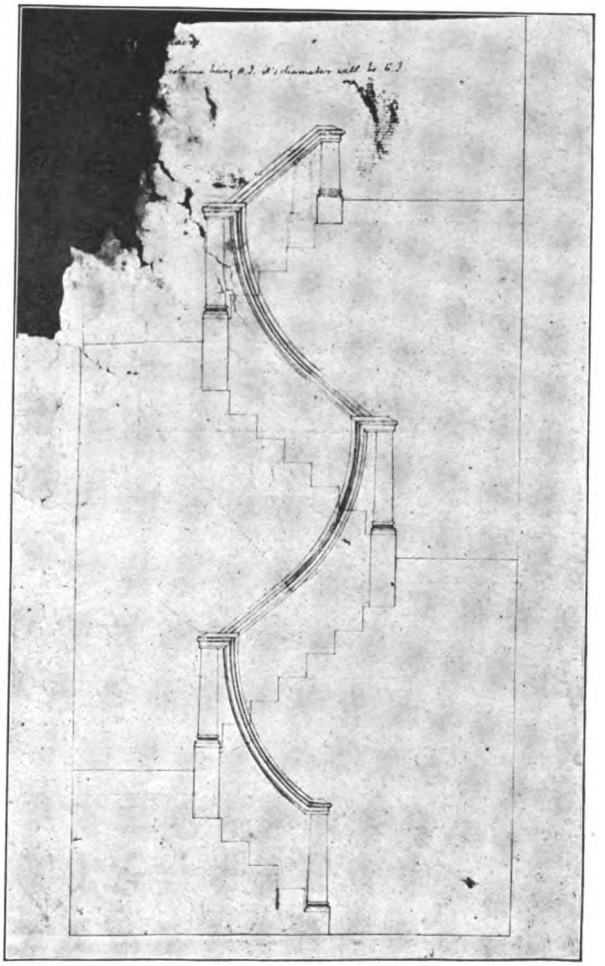


FIG. 23. INCH-SCALE DETAIL OF THE STAIRS, AT MONTICELLO, AS ORIGINALLY BUILT

Dunlap had evidently seen the drawings here published, then preserved by the Randolph family of Virginia. That he blundered in implying that

[1] Vol. ii, pp. 221–226. The statement that Mills made, "general drawings, the detailing of which Jefferson reserved to himself," with its implication that these general drawings were made prior to the details, is thus repeated by Montgomery Schuyler in Architectural Record, July, 1911, vol. xxx, p. 73, and elsewhere.

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Jefferson's details were drawn after Mills' general drawings, is now certain. Leaving aside the details of the original house, many of which were carried over into the remodelling, the remodelling itself was begun as early as

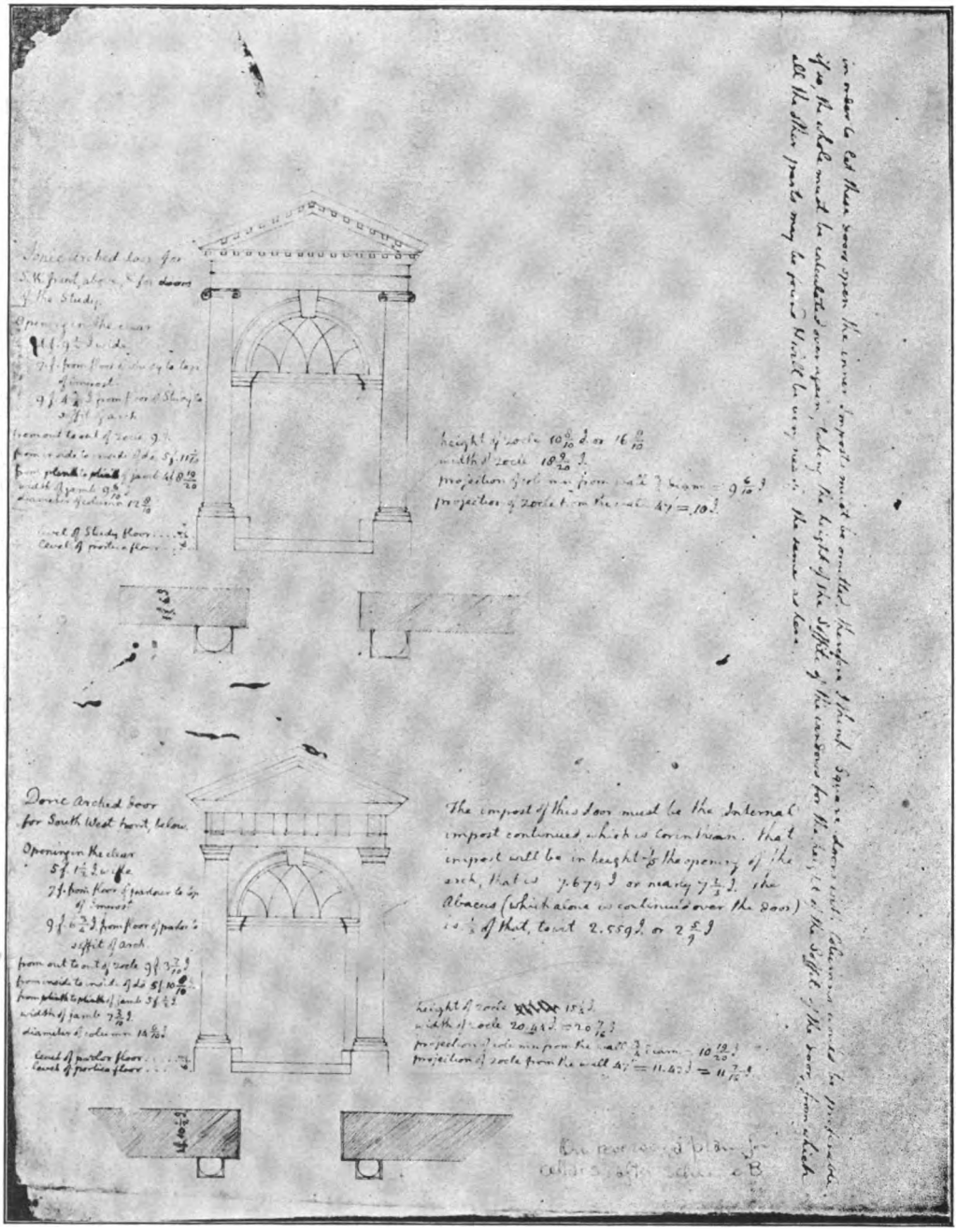


FIG. 24. REJECTED STUDIES FOR ARCHED DOORWAYS FOR MONTICELLO

1796, with plan and elevation fully determined, and the exterior must have been practically complete when Mills was first introduced to Jefferson. In 1796, according to the generally accepted date of his birth,[1]

[1] August 12, 1781. Glenn Brown: History of the United States Capitol, Appleton's Cyclopedia of American Biography. Vol. i, 1900, p. 97.

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Mills was still not fifteen years of age. His west elevation of Monticello which corresponds so closely to its present state, must have been made much later, from measurements or from Jefferson's own drawings. The sheet bearing both a plan and elevation resembling Monticello, is evidently a suggestion for a further remodelling, never carried out, which would have increased the height of the main building and the dome, and substituted low semi-circular arcades for the rectangular arcades of the piazzas.

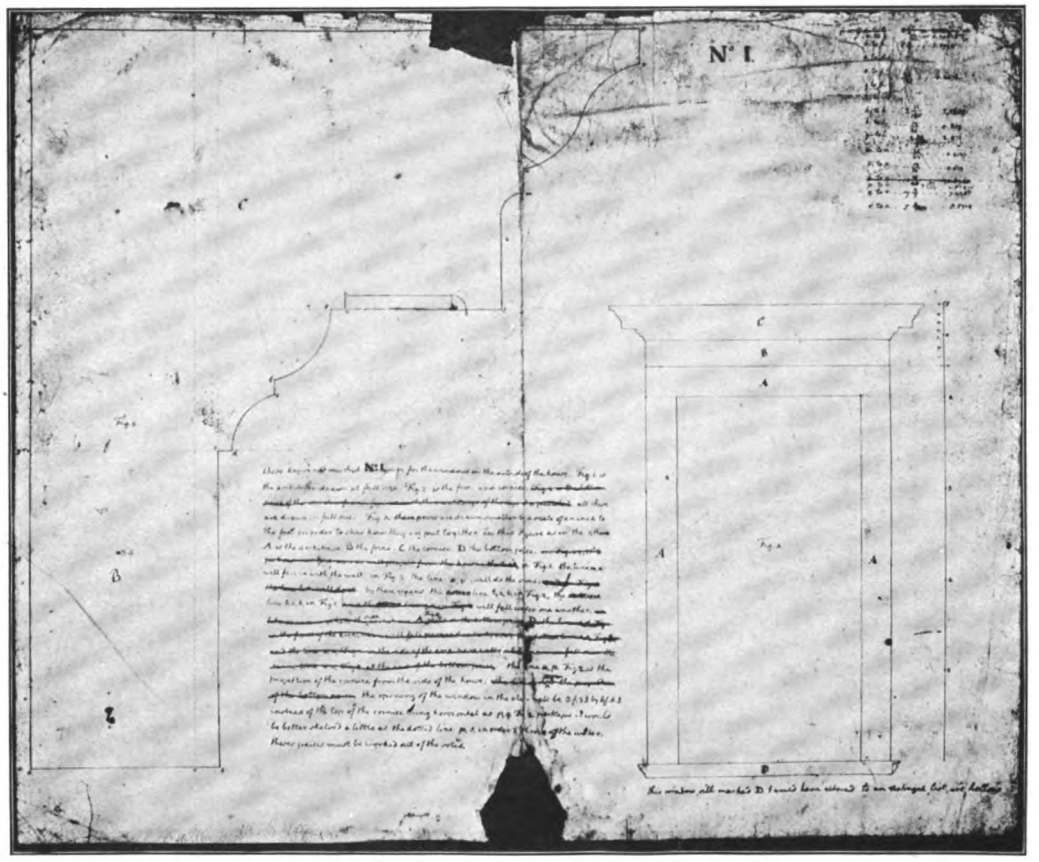


FIG. 25. SCALE DRAWING AND FULL-SIZE DETAIL OF WINDOWS, MONTICELLO

The third drawing, dated 1803, can apply to nothing else than the rebuilding of Shadwell — already mentioned as proposed at exactly that time — which would have had to conform to Jefferson's exacting architectural standards. An examination of Jefferson's published correspondence about 1803, and of the large number of unpublished letters at the Massachusetts Historical Society, has failed to suggest any other subject. The assumption may thus be taken as sufficiently probable to justify its further use.

With the sequence and purpose of the projects determined, in the main, it now becomes possible to search for their prototypes and to trace the process of their formation. The results will be important in determining the extent to which Jefferson was original.

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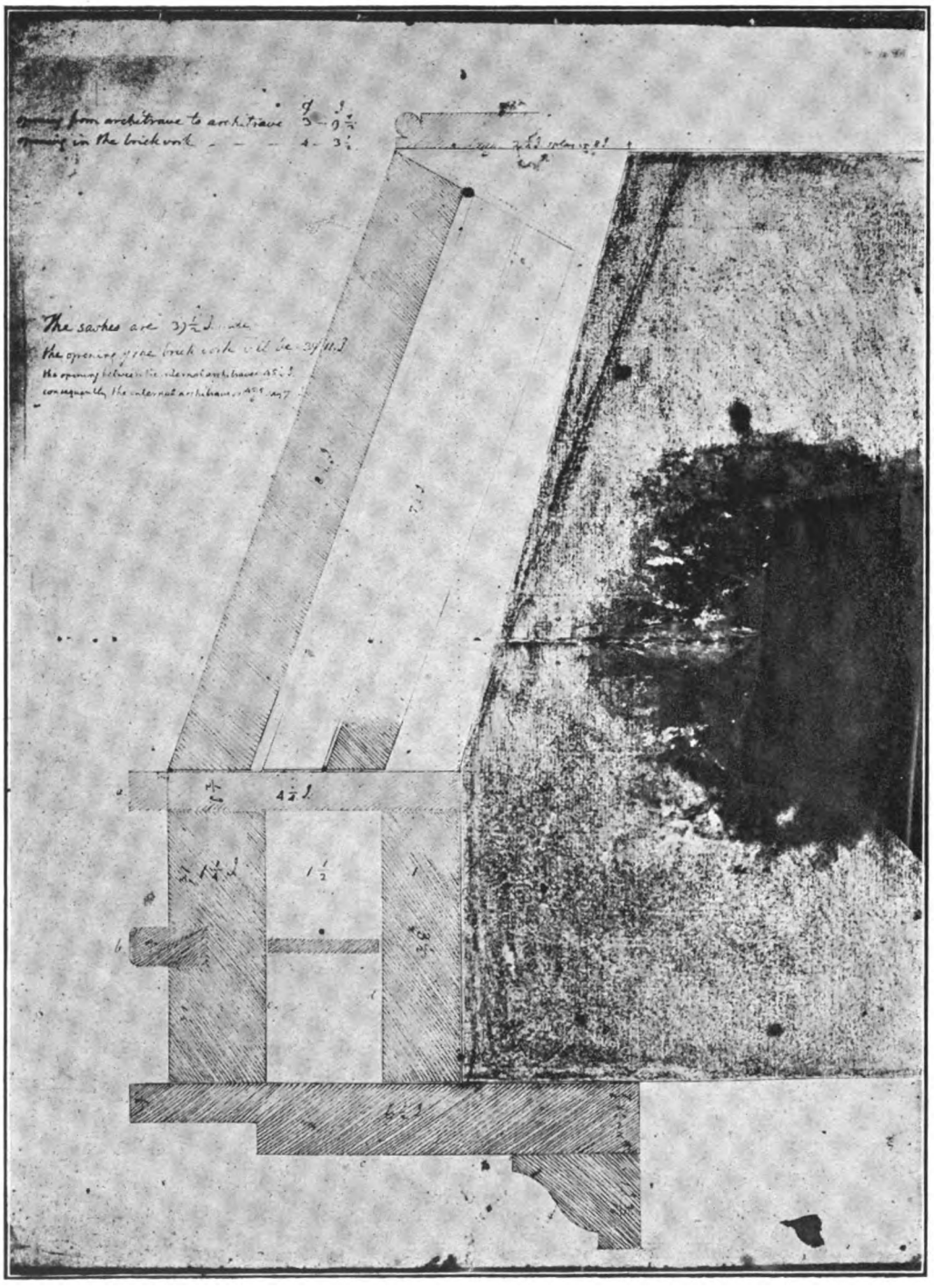


FIG. 26. FULL-SIZE DETAIL FOR CONSTRUCTION OF WINDOW-JAMB, MONTICELLO

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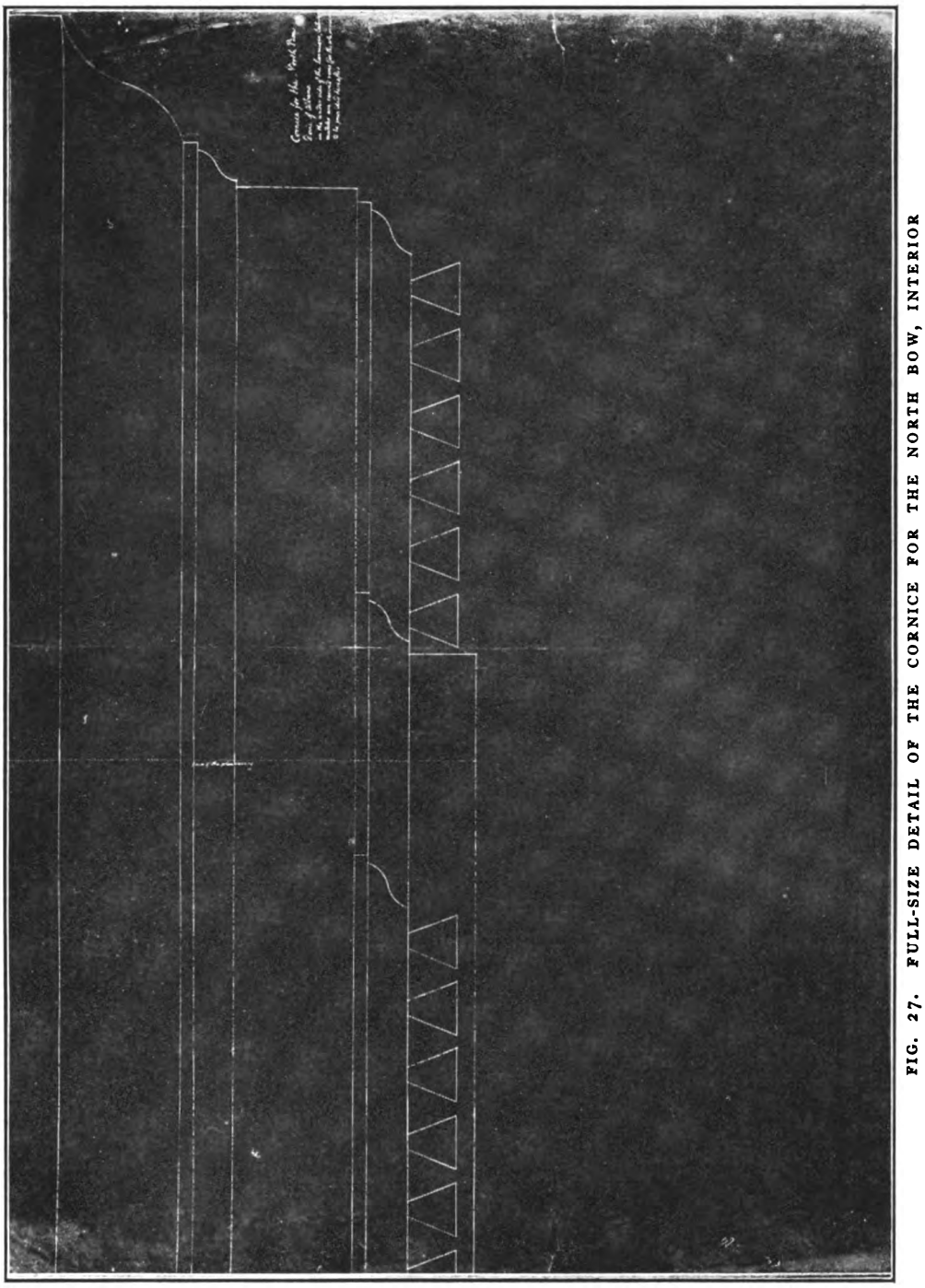


FIG. 27. FULL-SIZE DETAIL OF THE CORNICE FOR THE NORTH BOW, INTERIOR

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Mr. Norman M. Isham, in his recent discussion of Jefferson's place in our architectural history [1] has throughout minimized Jefferson's part in the design of his buildings. Of Monticello he says, " the house has in it nothing new, unless it be in relation to Virginia. It is an English plan of the first quarter or half of the eighteenth century, and could have been taken, with some changes, from Gibbs or even Ware. It may not even be new in Virginia. . . . It is more than possible that, if a chronologically correct sequence of Virginia plans existed, Monticello could be placed as a link in a chain, and not as a bold and wonderful innovation."

The new evidence now brought to light would of itself make profitable a reconsideration of the questions involved, if indeed such a reconsideration were not already necessary and possible. The chronological lists of colonial houses given in " The Georgian Period " are, to be sure, far from accurate; but the accumulation of special studies in local history [2] will be found to permit a sufficient verification. Knowledge of the books which Jefferson actually had in his early years will enable us to localize his published precedents, and to determine his precise indebtedness to European architecture. A fresh study may be made to see, so far as possible, what the existing stituation was in Virginia, and what precedents he may have had nearer home.

At the time Monticello was begun the prosperity of the older aristocracy of the Virginia coast was waning; that of the western planters was not yet fully enough established, in general, to produce ambitious dwellings. The substantial and dignified mansions of the James valley, like Shirley and Westover, representing a tradition purely Georgian and practically static, had almost if not quite ceased to increase in numbers when Monticello was first built. Among contemporary houses there were few of any architectural pretensions. It is from Jefferson himself that we have the best description of local architecture of the period. In his " Notes on Virginia," first published in 1784, he speaks not merely with characteristic disdain for what he regarded as solecism of detail in Georgian architecture, but with contempt for materials and workmanship.

" The private buildings are very rarely constructed of stone or brick, much the greater portion being of scantling or boards, plastered with lime. It is impossible to devise things more ugly, uncomfortable, and happily more perishable. . . . A workman could scarcely be found capable of drawing an order. . . . Buildings are often erected by individuals, of considerable expense. To give these symmetry and taste would not increase their cost. It would only change the arrangement of the materials, the form and combination of the members. This would often cost less than the burden of barbarous ornaments with which these buildings

[1] Journal of the American Institute of Architects, May, 1914, pp. 230–235. A review of " Thomas Jefferson as an Architect and a Designer of Landscapes," by W. A. Lambeth, and W. H. Manning, 1913.

[2] Bishop Meade: Old Churches, Ministers, and Families of Virginia, 1857; T. A. Glenn: Some Colonial Mansions, 1st and 2d series, 1898–99; E. C. Mead: Historic Houses of the South-west Mountains, 1898; E. T. Sale: Manors of Virginia in Colonial Times, 1909.

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are sometimes charged. But the first principles of the art are unknown, and there exists scarcely a model among us sufficiently chaste to give an idea of them." (Bergh, vol. ii, p. 211, 213.)

The architecture of the other colonies which Jefferson knew at the time, though more flourishing, shared some of the qualities he condemned. In 1766 he had been in Annapolis, Philadelphia, and New York. Their architecture, like that of the colonies in general, was marked by a translation of classic forms, both in proportions and in detail, into forms suitable for use in wood — a naïve adaptation to material which we to-day justly regard as one of its chief merits. The use of "ornaments not proper to the order," which Jefferson cited as a reproach, was little considered in America at that time. In domestic architecture the portico was less frequent than is now often supposed. A few houses, such as the Miles Brewton House in Charleston, had superposed porticoes in two stories; a single dwelling, Woodlands in Philadelphia, had a portico with columns running through both stories. Neither of these houses, commonly dated 1765 and 1770, are exceptions to the usual freedom of detail. A few buildings only — buildings which Jefferson had not yet seen, such as St. Michael's, Charleston, and King's Chapel, Boston — each believed to have resulted from close relations with English architecture — had porticoes of academic proportions and formally correct detail. The plans usually involved no element but the rectangle. Even the octagon and the bay-window were rare. At Philadelphia, Waln Grove (1764 ?) has octagonal ends to the wings, the Randolph mansion has an octagonal-ended ball room added at a later date.[1] Only in Charleston, the most luxurious of our pre-Revolutionary towns, was a central projecting salon used, the result in part, perhaps, of French influence there. Such features as the attic and the dome were practically unknown.

The first studies for Monticello, to be sure, present little or nothing beyond the arrangements then current in the colonies. They show possibly a trifle more knowledge than usual of classical forms, and a greater fondness for literal accuracy. The arched loggia in Fig. 5 is rather exceptional, as is the carrying of a cornice around the house above the first story as noted on Fig. 14. The principal proportions are carefully specified according to rules which show that Jefferson had access by this time to some elementary book at least. Even the earliest sketch of a cottage has its pediment, instead of the gable which would usually have sufficed in such a case.

In marked contrast to the general simplicity of these plans is the classical sophistication appearing in plan B (Fig. 13) and all the later drawings. The columns, responds, and niches, betoken quite a different inspiration. A careful comparison with Leoni's Palladio leaves no doubt that this was the primary source of the whole group of drawings belonging to the earlier house.

[1] Wise and Biedleman: Colonial Architecture, 1913.

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The details of the lower and upper orders, external, were taken literally from Palladio's Doric and Ionic, Book I, Pls. xvi and xxii; the window cornice from Pl. xxxv. Even the suggested construction for drawing the curved profiles with compasses was followed, and the egg-and-dart ornament of one moulding was copied, though with an unpractised hand.

For the general drawings, plans and elevations, no such literal precedents can be found, in Palladio, in Gibbs' "Book of Architecture" and Kent's "Designs of Inigo Jones, etc." — two books to which Jefferson gives references later on — the drawings for garden pavilions, or in any other book which Jefferson then had which I have been able to examine.[1] Practically all the elements, however, occur in Palladio in combinations very similar to those in Jefferson's drawings, more similar than those in any other source. The superposed portico and the attic story are both commonplaces in Palladio, though they happen never to be combined as in Jefferson's elevation; in Gibbs the attic is rare, in Kent almost or quite lacking; in both Gibbs and Kent the superposed portico never occurs. Such a drawing as Palladio's Plate LXI, Book II (Fig. 28), is by itself almost sufficient proof of Jefferson's architectural ancestry. It shows equally well, also, his reaction on his prototypes, for though the elements are much the same, there are marked divergencies — the orders are different, and the disposition differs both in elevation and in plan.

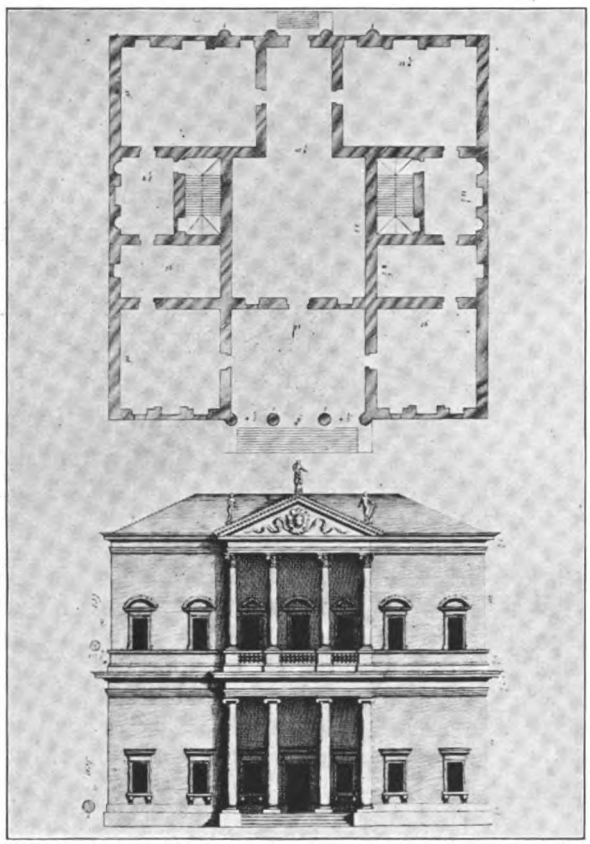


FIG. 28. PALLADIO'S PLATE LXI, BOOK II. AN ANCESTOR OF JEFFERSON'S TWO-STORY ELEVATION FOR MONTICELLO

The resemblance of the plan B (Fig. 13) to the plan of the central block in Palladio's Plate XLI, Book II (Fig. 29) though by no means absolute is suggestive. The type is a common one in Palladio and has a

[1] Jefferson's own copies of several works, still preserved in the Library of Congress, add no evidence to what might be obtained from other examples, as they are practically destitute of marginalia and are uniformly free from signs of hard usage. Of other architectural works which he owned I have seen copies of all but Robert Morris's "Select Architecture. Being . . . designs of plans . . . well suited to both town and country . . . ," of which no copy has been found in a search through the leading American Architectural and general libraries.

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number of reminiscences in Gibbs. The L-shaped service wings are also characteristic of Palladio's schemes; they recur in Gibbs, Plate 57 (Fig. 30). There would seem to be no question that it was from such plates that Jefferson got his idea of the wings with their corridors and lines of rooms. The dropping of them to the basement level, made possible at Monticello by the fall of the mountain, is merely a clever turning to advantage of natural conditions. It is more than possible that Jefferson took his departure precisely from the plate in Palladio just illustrated (Fig. 29), as this is the only one which combines with the L-shaped wings a type of plan which was considered for the main house.

The plan C has no close resemblance with any of the plans given in Palladio, Gibbs, or Kent, and would seem, in its original form, without the octagons, to be a classical version of the earliest studies which were shown in Figs. 14 to 16. The scheme of a central building, with flanking rooms of one story, is preserved from these studies; the principal room with its niches and portico is taken over verbatim from B.

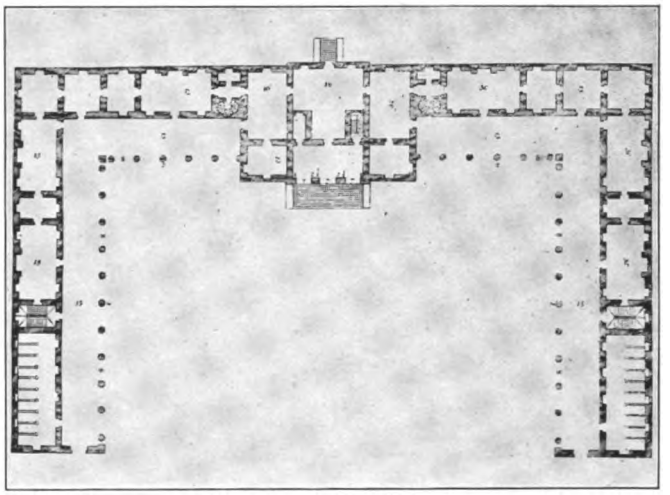


FIG. 29. PALLADIO'S PLATE XLI, BOOK II. AN ANCESTOR OF JEFFERSON'S SCHEME B, AND OF HIS ARRANGEMENT OF DEPENDENCIES

The addition of the octagonal projections presents something of a riddle. The octagonal form does not occur at all in Palladio's book, even in interiors; never as an external projection in Kent, and but once in Gibbs, though it was a favorite with them as an interior form. Its use externally, as a "bay-window," was as rare in Georgian England as in the colonies. It is difficult to see how the influence of the examples in Philadelphia and Charleston might have come to bear at just the date when the change was made. It is possible that the idea came from one of Gibbs' garden houses, Plate 69, of which a tracing exists among Jefferson's drawings (Fig. 31). It is also quite possible, however, that the idea came precisely from the one book of Jefferson's which it has not been feasible to examine — Morris's "Select Architecture." Morris's other book, "Architecture Improved," contains several plans with axial rooms having octagonal projections exactly like the ones at Monticello, and it is reasonable to assume that his designs had a family resemblance.

The process of formation of the early design would seem to have been somewhat as follows: After making his first crude sketch for the square cottage, Jefferson began the plans for the main house on traditional lines;

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and, securing some elementary book of rules, made the drawings in Figs. 14 and 15. Before any work was begun, however, he obtained his Palladio, and displayed his individual genius by recognizing its superior authenticity and by determining to follow it closely. Being attracted to Plate XLI of Book II, let us say, by its feasibly small size, convenient disposition, and adaptability to the site, he turned from his original scheme for the main house long enough to make the plan B, in order to see if he could adapt to his requirements the house shown in the plate. The second story was omitted to reduce the accommodation; a portico was added as indispensable somewhere in any building which aimed to be truly classical. Evidently he decided against using this scheme, and determined instead to modify his own earlier one, and employ the Palladian service wings with it. He accordingly made the first study for C, keeping the dimensions and form of the principal room in B, and adopting its portico. The basement was built on these lines, and Jefferson made his measured plan of it. On the basis of this he drew the final study for C, without the octagons, and made the general plans of the offices and the terraces. We may then suppose him to have secured his copy of Gibbs or Morris, to have added the octagons to the main building, drawn the octagonal outchambers, and corrected the general basement plan to provide for their foundations.

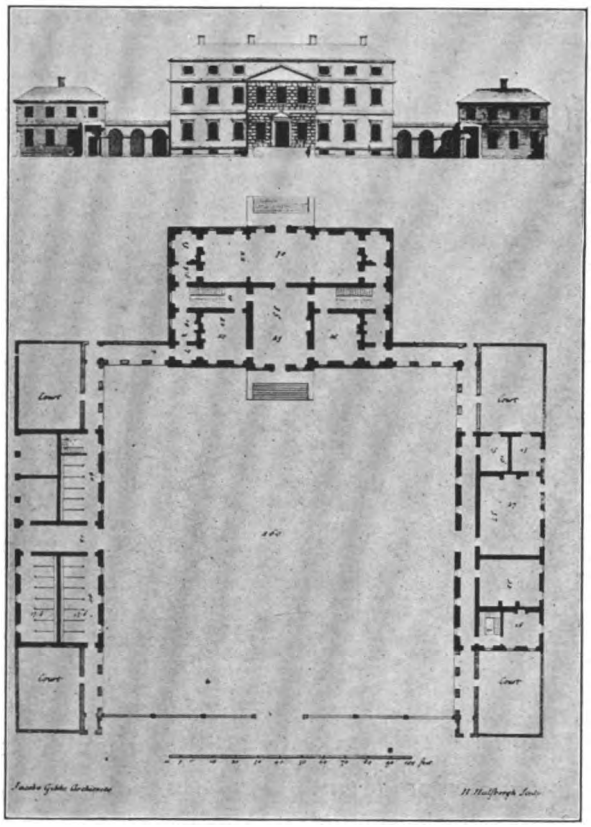


FIG. 30. GIBBS' PLATE 57. CO-DESCENDANT FROM PALLADIO WITH JEFFERSON'S PLAN IN ITS ARRANGEMENT OF DEPENDENCIES, AND A POSSIBLE AUXILIARY SOURCE

The observations necessary to establish this series in its main lines have already been given in the text. A variety of minor evidences might be added which have assisted in verifying the precise order of single drawings. So numerous and minute are Jefferson's notes and measurements that the exact position of each drawing in the series can be established with almost complete certainty.

It appears thus that the earlier Monticello was not only new in Virginia, in its forms inspired directly by Palladio, but that its following of Palladio was no more slavish than that of academic Europe generally, and involves

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no negation of Jefferson's originality. The return to canonical proportions and scholarly correctness of detail were epochal, the use of the attic story and the novel disposition of the service quarters not less so. It was the classical accuracy and superior convenience of Monticello — coupled, doubtless, with the enthusiastic interest of their host — which drew the attention of foreign visitors to this house, and caused them to praise it above all others in America. While the northern mechanics were drawing their ideas from sources like " The British Carpenter," and the " Builder's Jewel " Jefferson had been drinking nearer the fountain head.

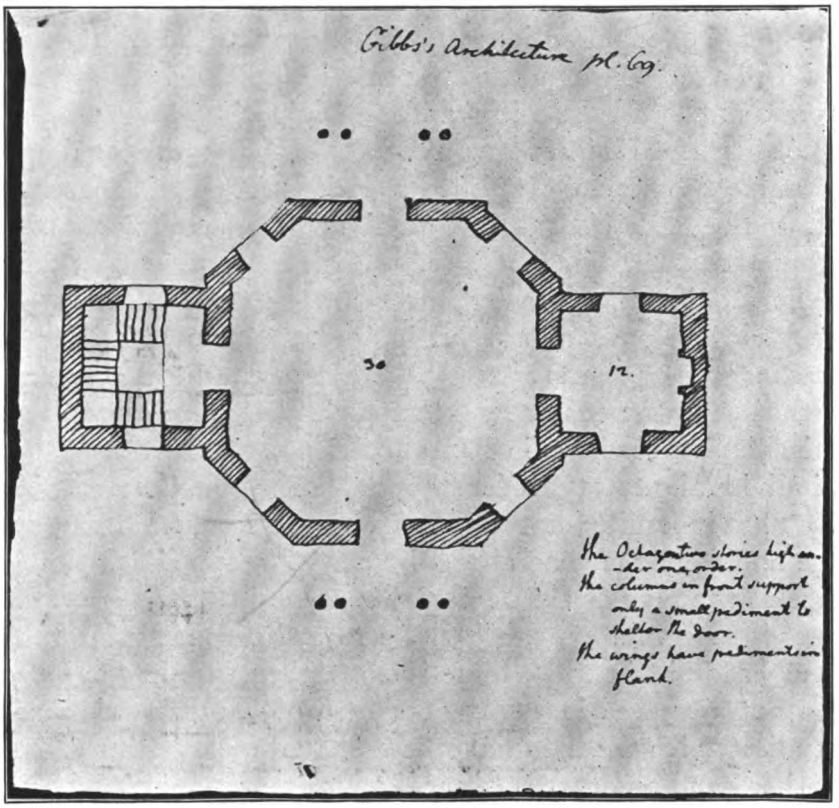


FIG. 31. DESIGN FOR A GARDEN HOUSE, TRACED BY JEFFERSON FROM GIBBS' PLATE 69

In the Paris of Ledoux and of the Hotel de Salm he felt he had come still closer, and his house, in spite of its strict Palladian detail, must no longer have satisfied him. The Paris hotels were like the Roman villas in having, or seeming to have, but one story; his attic and intended superposition of orders had to go. On the other hand a dome, always the favorite central feature in France, was indispensable. The space lost by this substitution was to be regained, and more than regained, by doubling the width of the house, so that his daughters and their families could be with him. The great height of the first floor was deemed unnecessary for the new private rooms which were to be provided; the best taste of France had decided similarly in such rooms as that of Marie Antoinette at Trianon. A mezzanine was consequently adopted for the new portion,

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with windows connected so that the effect of one story should not be destroyed. The alcove bedrooms, to which Jefferson had become so much attached in France, could not fail to be introduced. If in the transformation something was lost in clearness, in inevitable relation to the dependencies, this was immaterial to Jefferson's mind, compared with the truer approximation to Roman precedents which was secured.

The lack of an important stairway is still often ridiculed as an oversight in spite of Miss Randolph's explanation; more recently it has been defended as an intentional omission to preserve the effect of one story. The presence of stairs in the earlier house and in Jefferson's other designs sufficiently disprove one contention; the gallery across the hall, as tell-tale as stairs would have been, renders the other improbable. Even Miss Randolph's account scarcely withstands examination. The dome room though not used for billiards was put to other uses; the lodging rooms of the mezzanine themselves furnished sufficient motive for a central stairway had one been desired; moreover room was lacking to approach the dome from the gallery in any case. Critics and defenders alike would seem to be judging the plan by houses of the Colonial type, where the staircase was developed as an end in itself, though it invited even the chance comer to the private apartments. It was in the interests of modern privacy that Jefferson reacted against such a practice, placing the stairs at Monticello, as elsewhere, in lateral corridors.

Any individual prototype for the remodelled plan is scarcely to be sought. That it resulted naturally, as we have seen, from the form of the old house and from the general requirements. Its striking superficial resemblance to the plan of the Maison Beaugeon in Paris, shown by Krafft and Ransonette, Plate 46, can only be regarded as accidental. Though this house was built in 1781, there is no resemblance in the facades; the book had not appeared in 1796; no sketch of the plan exists among the many studies which seem to have been made by Jefferson while abroad. On the other hand an entry on page 6 of the new measuring book, stating "The model of the Dome is taken from the Temple of Vesta. Pallad. pa. 22. Pl. 39," shows that Jefferson still turned to his old authority in matters of detail at least.

Although the changes which Jefferson made in Monticello were doubtless taking form in his mind during his years in Paris, they were not made definite and carried into effect till after 1796. Meanwhile new forces had appeared in American architecture, which rendered Monticello less isolated, and might be thought to have anticipated the innovations embodied in Jefferson's remodelling. Hoban, L'Enfant, and Thornton had come to this country, and designs of theirs were already executed or in process of execution. It is worth while to consider their stylistic tendencies, in order to appreciate Jefferson's later contributions at their true value. All of the men just named — unlike Bulfinch, who developed and enriched the native colonial style — represented something essentially European.

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With Hoban it was the English Palladianism of Gibbs, tempered in the design for the White House by the French traditions of Charleston. The free-standing porticoes running through two stories, which give the White House its Roman-classical aspect, are well known to be later additions by Latrobe under Jefferson's administration. L'Enfant's executed designs, like the unexecuted studies of his compatriot Hallet, are for the most part pure French of the period of Louis XV. L'Enfant, at least, was untouched by direct classical influence. His Federal Hall in New York was much in the manner of Gabriel; his often abused house for Robert Morris seems, from the cut in Watson's "Annals of Philadelphia," to have been a modified version of the Hotel de Biron, reproduced in unfriendly environment and after its day was really past. Hallet, and especially Thornton, had felt some breath of contemporary classical afflatus, evidenced particularly in the largeness of conception of their plans. In the membering of wall surfaces even Thornton remained true, on the whole, to the academic tradition of eighteenth century France.

Jefferson alone among Americans, we now see, was then abreast of the artistic movements of Europe. Latrobe, who represented a still later phase, had not yet arrived. Jefferson's new Monticello antedates by several years any other American house which shows the influence of Romanizing ideals. Tudor Place in Georgetown, Thornton's most classical design — stated by Mr. Glenn Brown to have been built about 1810[1] — falls far short of Monticello in conformity with European ideas then current. Jefferson's dome, indeed, remained almost if not quite unique in our domestic architecture.

His advanced position appears nowhere more clearly than in the garden pavilions, where his inclinations were unrestrained. Ridiculous as they may seem to us, these models — Roman, Gothic, Chinese, and Greek — typified the widening conception of architecture which could look behind the unconscious tradition of the moment and recognize a variety of styles, historically ordained. In America, Stuart and Revett, or Chambers either, had scarcely been invoked before; and the Gothic model, however crudely it might have been executed, would have been the first work of the Gothic revival in this country.

The drawing by Mills for a remodelling of Monticello would seem to represent Mills' ideas rather than Jefferson's, drawn up independently and only submitted to Jefferson when complete. In contrast to the design for Shadwell, it bears Mills' name only. The detail is by no means strictly Palladian, but includes elements suggestive of France (the pedimented windows and the perron), and of American vernacular (the fanlight door and the thin attic cornice). Some of the changes proposed are of an extravagance quite contrary to Jefferson's economical habit — like the substitution of taller columns. This design, then, to the extent that it is new, is to be considered not with Jefferson's works, but with Mills'.

[1] "Dr. William Thornton, Architect," Architectural Record, vol. vi, p. 64.

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The design presumed to be for Shadwell will be found to provide an instance of Jefferson's use of precedent still more marked than the studies for Monticello. In this case there can be no question that he took his departure direct from one of Palladio's designs, none other than the famous Villa Rotunda, as published in Plates 14 and 15 of Book 2. (Figs. 32 and 33.) As the last word in Italian classicism, this had already been imitated in England, among others by Gibbs and Campbell, and by Lord Burlington at Chiswick — the first estate which Jefferson had visited in his tour of the English gardens. It is not surprising that he should have sought an opportunity of reproducing the same model; indeed, a study of his other drawings will show that this was not the first time he had attempted it. The true dome, the top-lighted central salon, the hexastyle portico of the prototype would all have been new in an American house. The literal reproduction of a foreign type may be condemned *a priori* by some, but it should not be forgotten that natural conditions and social life in Virginia were sufficiently similar to those of Palladian Italy to give the proceeding a large measure of justification.

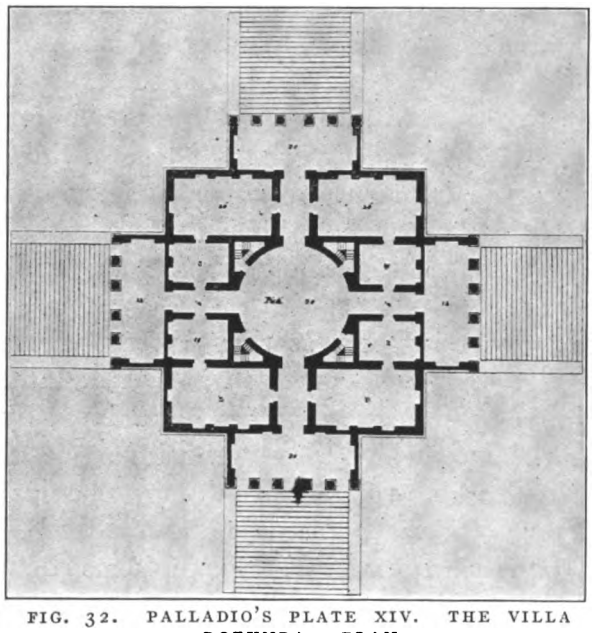


FIG. 32. PALLADIO'S PLATE XIV. THE VILLA ROTUNDA. PLAN

The design for Shadwell preserves the characteristic arrangement and the central feature; but it is smaller and less strictly imitative. The hexastyle porticoes are replaced by widely spaced tetrastyle porticoes on front and rear, by octagonal projections, like those of Monticello, on the sides. One of the porticoes is made to serve specially as an entrance, the other primarily as veranda for an oval salon, introduced between it and the central hall and projecting somewhat into the portico. By these changes the design lost the absolute formal balance of its original; it became less doctrinaire more flexible, more specialized, more practical. It is questionable of course, in spite of the inscription " T. Jefferson, Arch't," whether Jefferson or Mills was really responsible for the changes. The octagonal projection was part of Jefferson's customary vocabulary of forms; the oval room, however, occurs nowhere else among his drawings, except in a single sketch for an irregular hotel *à la Paris* among what seem to be foreign studies. To Mills, on the other hand, the form was especially familiar, both in Charleston and Hoban's design for the White House on which he had worked. The underlying idea, of course, re-

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mained Jefferson's, and the changes can hardly have been made without his consent.

The models of classical taste which Jefferson had demanded in his "Notes" he thus provided, and provided single handed. In Virginia the experienced artisans of New England and Pennsylvania were wanting. La Rochefoucauld-Liancourt observed in 1796 that there were not four stone masons in the county of Albermarle. Jefferson was forced to train his slaves to do the work he required; he wrote that they could not proceed an hour without him.

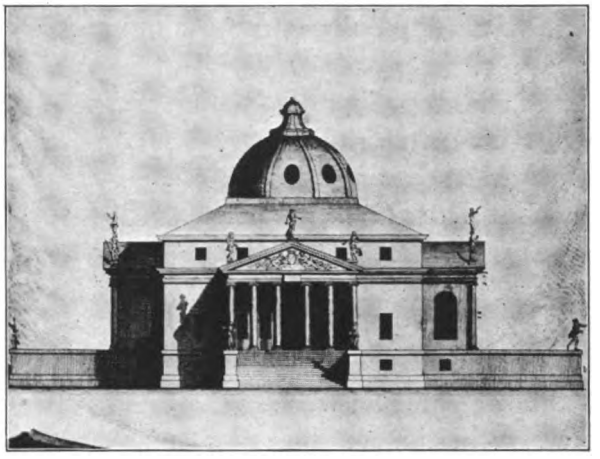


FIG. 33. PALLADIO'S PLATE XV. THE VILLA ROTUNDA. ELEVATION

In his classical designs such as those for Monticello, Shadwell, Farmington, and Bremo, he furnished types dependent on large masses, good proportion, and conventional detail, admirably adapted to local conditions, which stamped their impress on almost every Virginia house of distinction before the Civil War. The temple portico with a single large order embracing the full height of the building, in the use of which Monticello was for some time unique in the South, became the accepted motive of the early houses of the new century — a number of them from Jefferson's own designs or under his advice. The isolation of the servants' quarters with connections below grade was likewise imitated.

The influence of Jefferson's houses was not however confined to Virginia alone; it extended throughout the South. Numerous examples could be cited, such as the Bullock and Hansell houses at Rosewell, Georgia,[1] which are almost purely Jeffersonian. Even beyond the sphere of domestic architecture Monticello has its importance, as the first evidence of that revulsion of feeling soon to manifest itself in a strict classicism in public buildings — among which Jefferson's designs were also so notable.

III. Jefferson as Architect

The artistic estimate which must ultimately be based on discussion of all Jefferson's works, will not differ essentially from the conclusion to be drawn from his designs for Monticello and Shadwell. In them, as in others, he appears as an architect in the true sense, making the preliminary studies, working drawings, full size details and specifications for his build-

[1] "The Georgian Period," vol. iii, p. 96.

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ings, and supervising their erection, for the most part without assistance from any one. His architectural draughtsmanship, as illustrated in the earliest elevation of Monticello, is beyond comparison with the crudeness of the published drawings by other native designers of the time, and remained unrivalled here until the advent of Thornton and the first well-trained architects from abroad, during the last years of the eighteenth century.

In the development of his designs he brought to bear a knowledge of architectural books and a fund of foreign observation then unique in America. He used them with prophetic insight and with a literal accuracy hitherto unknown in this country, at the same time making his precedents his own as truly as an academic architect can. These precedents were drawn entirely from Europe. They represent not English-vernacular, but Roman-classical architecture as it was understood by Palladio and by the French of the late eighteenth century. In classical ardor, Jefferson even outdid his masters, though lack of means prevented him from rivalling their effects. To America, where the English tendency of Wren had always been followed at the expense of strict Palladianism, the ideal of classicism was new. With Jefferson it was consciously expressed. He saw in the building of the Virginia capitol at Richmond in 1785 "a favorable opportunity for introducing into the State an example of architecture in the classic style of antiquity"; and his houses were inspired by the same spirit of propaganda. Though a few isolated uses of "Adam" forms appear at dates perhaps earlier, even, than the first work at Monticello, Jefferson's buildings remain the first real monuments of the classical revival in America. The architectural career of Thornton in this country did not begin until 1793; Hoban's began scarcely earlier, and Latrobe's not till 1797 at soonest. When it is considered that the first important work of these men was done directly under the encouragement and supervision of Jefferson, first as Secretary of State, from whom the commissioners of the city of Washington took their instructions, and afterwards as President, it will be realized how truly Jefferson may be called the father of our classical architecture.

Whatever may now be thought of the movement in which he was the leader, it was one which every cultivated person of that day applauded. Foreign visitors were unanimous in praise, and compatriots testified their agreement by imitation. In truth the classic revival was as compelling and universally accepted in its day as great artistic movements of any earlier time. It cannot be questioned, moreover, that it met a real need in American architecture, which the naïve and delicate Colonial style could never have satisfied. For the monumental requirements of a powerful nation and its great capitol the Colonial was unquestionably inadequate. After its complete failure to produce a worthy design in the competition for the Capitol building, Jefferson's urgings were no longer needed to make this inadequacy apparent to every one, and the victory of the classic in

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official architecture was complete. In all this Jefferson's attitude was almost precisely that taken in the generation just past, by the pioneer of our second classical revival, McKim, many of whose methods bear so striking a similarity to those of Jefferson. Of Jefferson as of him, and in the same sense, it may be said, " He stood for a national architecture . . . built on the solid foundation of law, order, and tradition."

It was not to be expected that, however radical his intentions, Jefferson could wholly break away from the earlier manner which he condemned. Fortunately for him, perhaps, there was then, as always no escape from the pervasive traditional style of the time. Sharing with other American buildings their materials, brick and wood, his works inherited unavoidably much of the homely domesticity and beautiful texture of their predecessors. It is this inevitable difference between Jefferson's intent and his results that permits the confusion of his work with the Colonial, and which at the same time makes it, like every attempted revival, a new creation. There is no mistaking it either for the work of the Palladians or that of the French Romanists; it is an individual blend with native elements, which make it, too, our own.

The attitude of Jefferson toward his art, contrasting with the attitudes of some other leaders of the classical movement like Schinkel, Robert Adam, or Chalgrin, is not difficult to define. Strong as was the artistic impulse which led him to expend on architecture, in every position in which he was placed, so much money and energy, the scientific impulse was still stronger. Relish for precision in every department of life, coupled with historical passion, dominated his work. In his studies we see little of that free plasticity which makes the sketches of self-confident artistic masters so delightful. Instead we find a determined effort at formulation, a logical following through of consequences, and above all a reverent historical attitude, less toward the immediate past than toward the great past — all highly characteristic of certain phases of the age then just beginning. Jefferson's art was the art of retrospection and of science.

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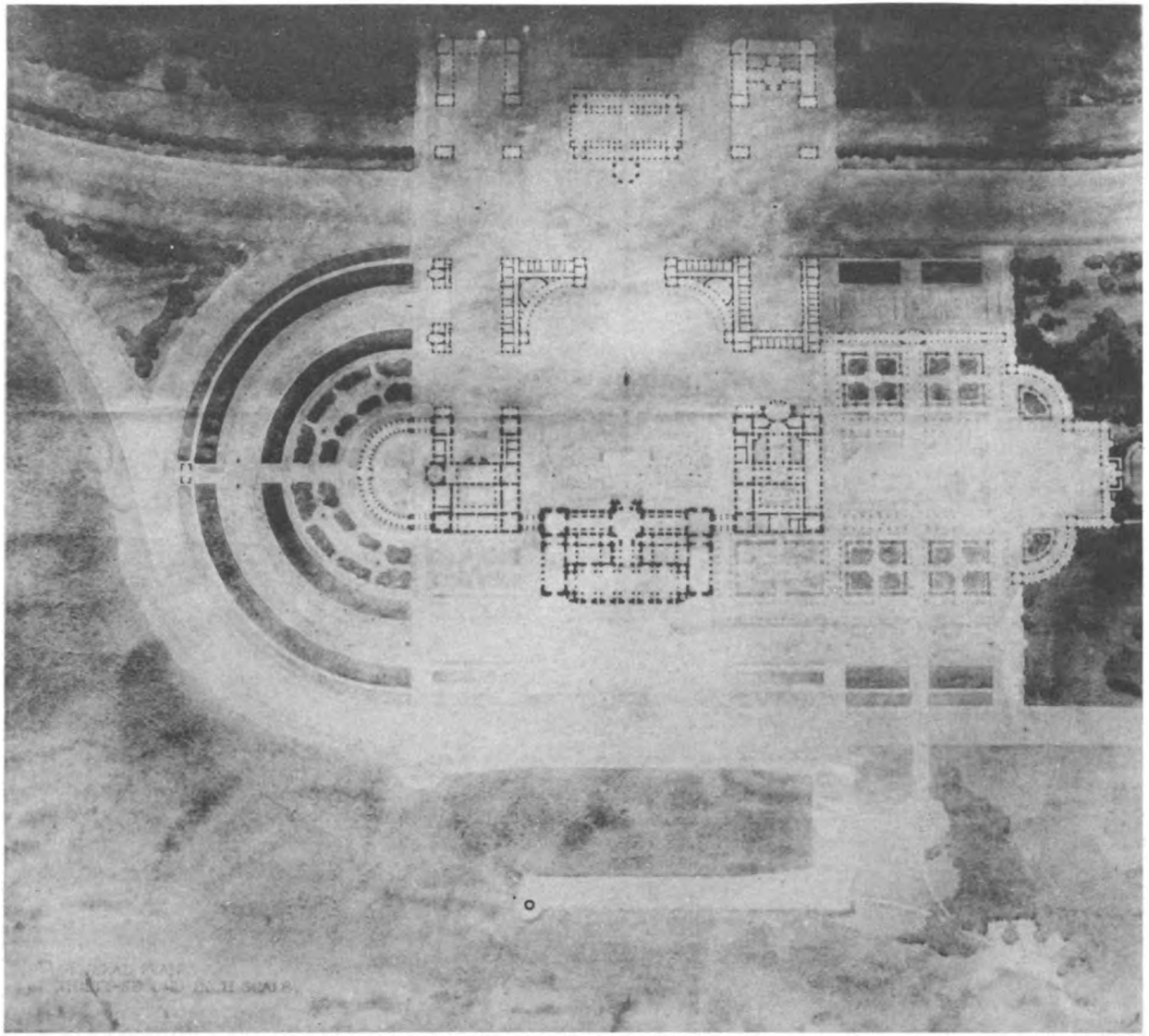
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A PALACE FOR THE GOVERNOR OF THE PANAMA CANAL

A THESIS DESIGN SUBMITTED FOR THE DEGREE

SIDNEY F. KIMBALL, A. B. '09, M. ARCH. '12

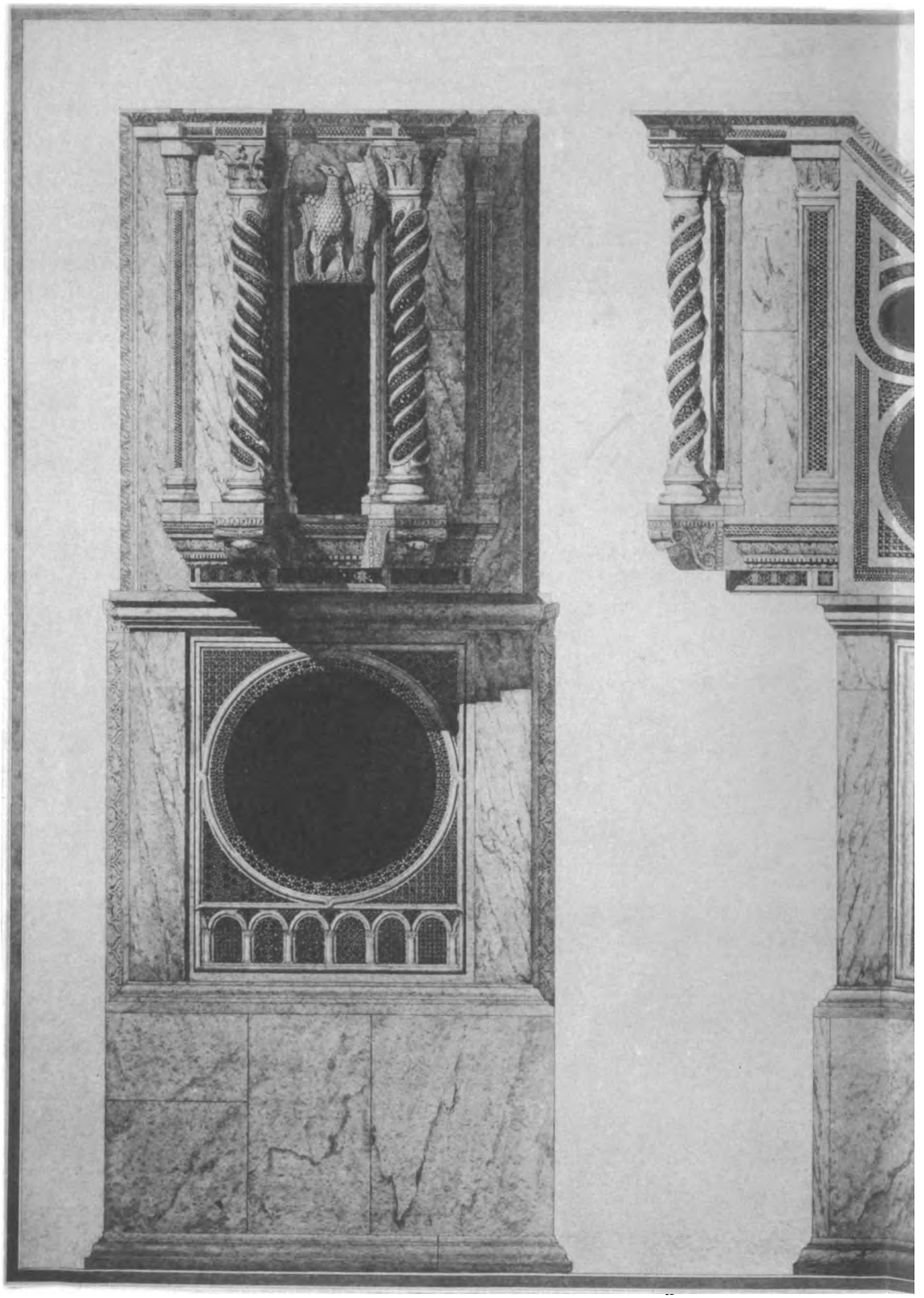
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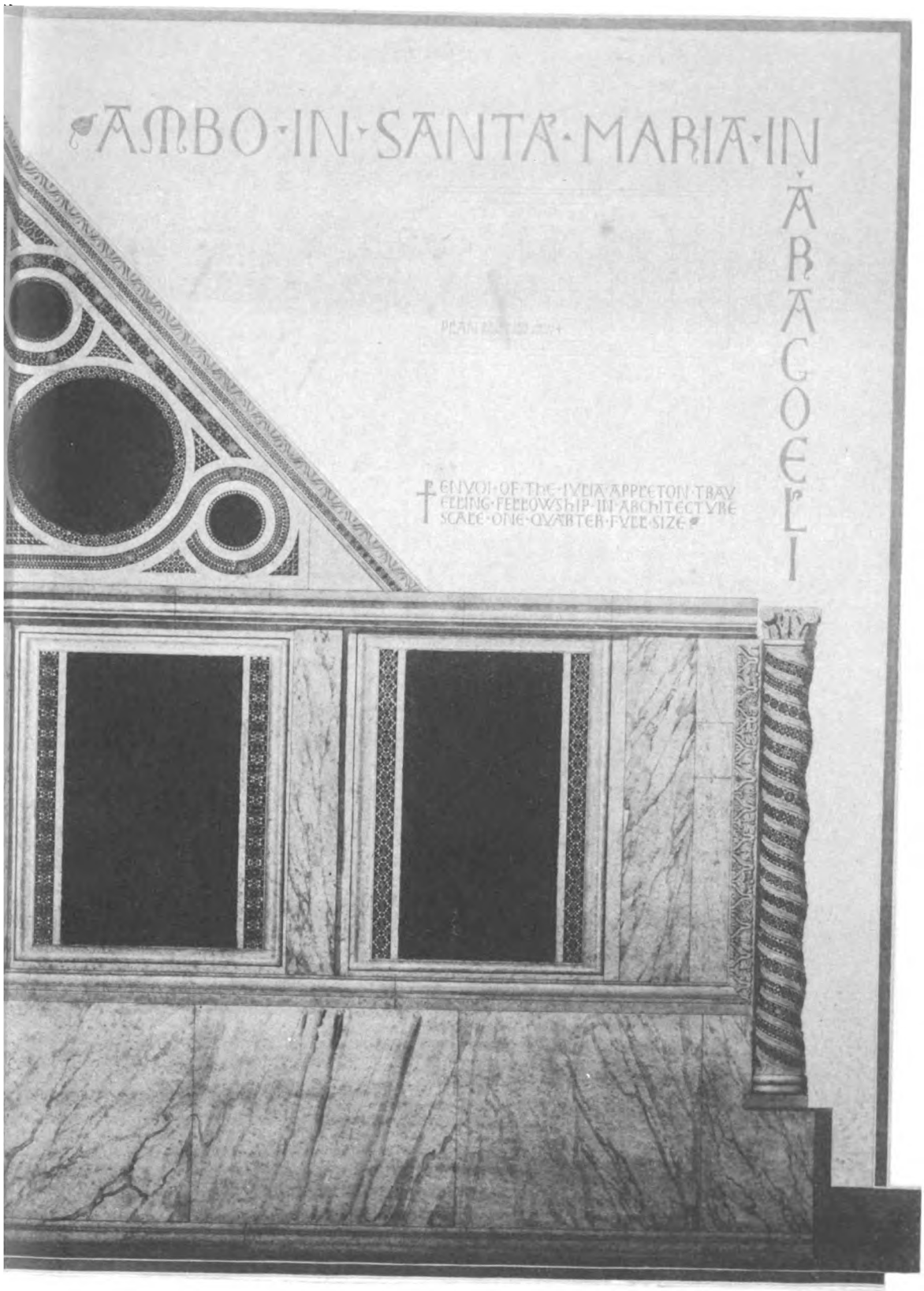


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A IN ARACOELI, ROME

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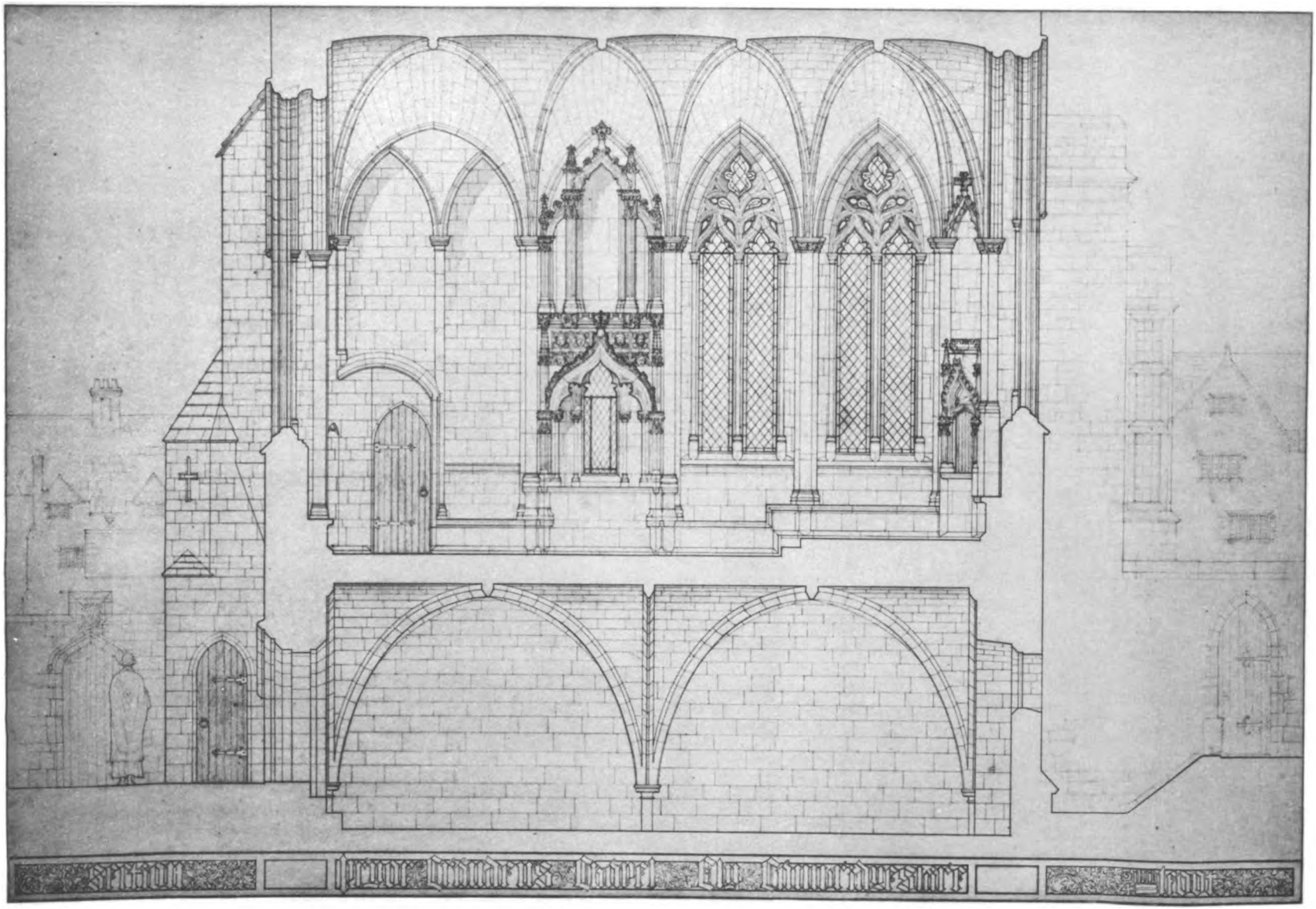
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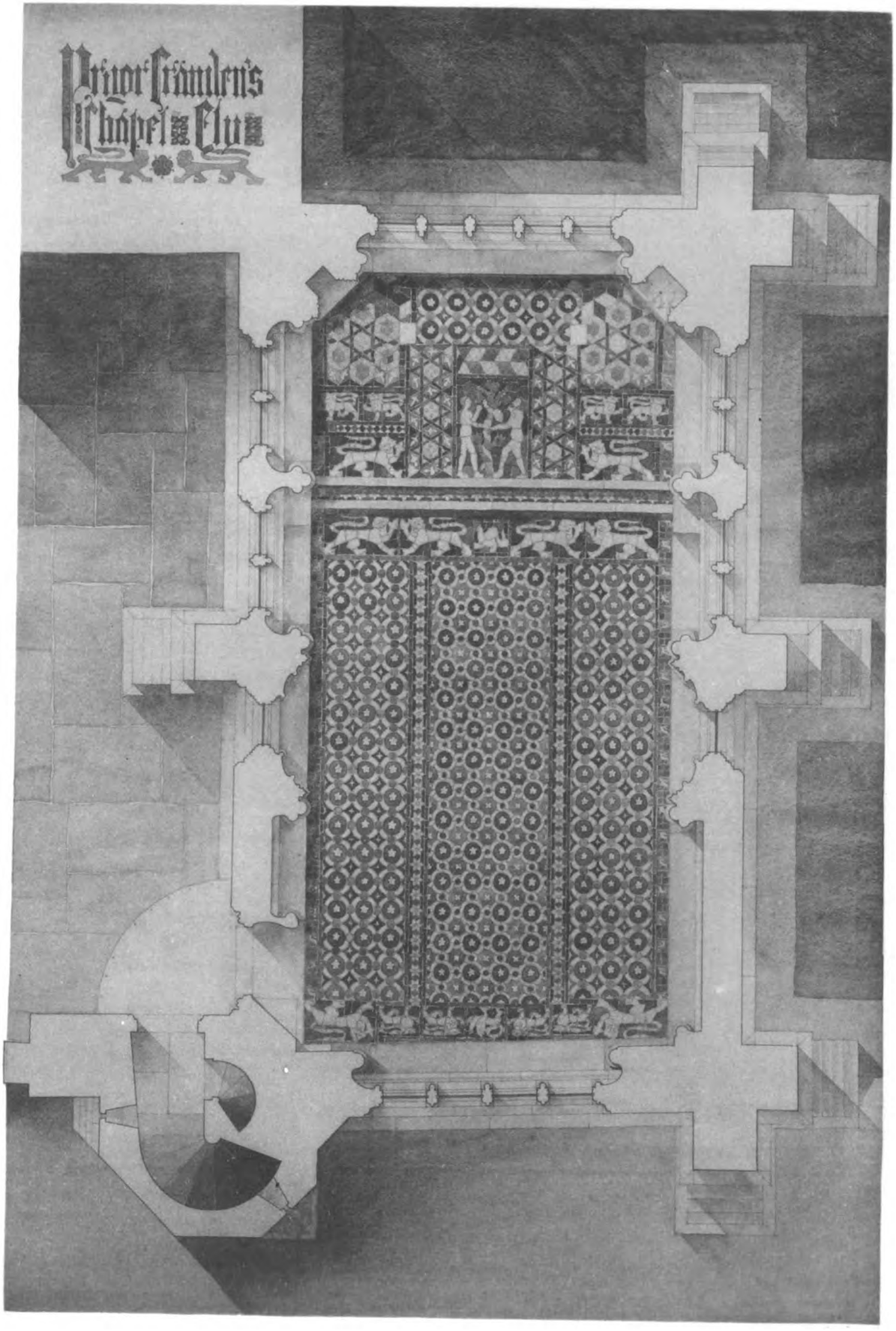
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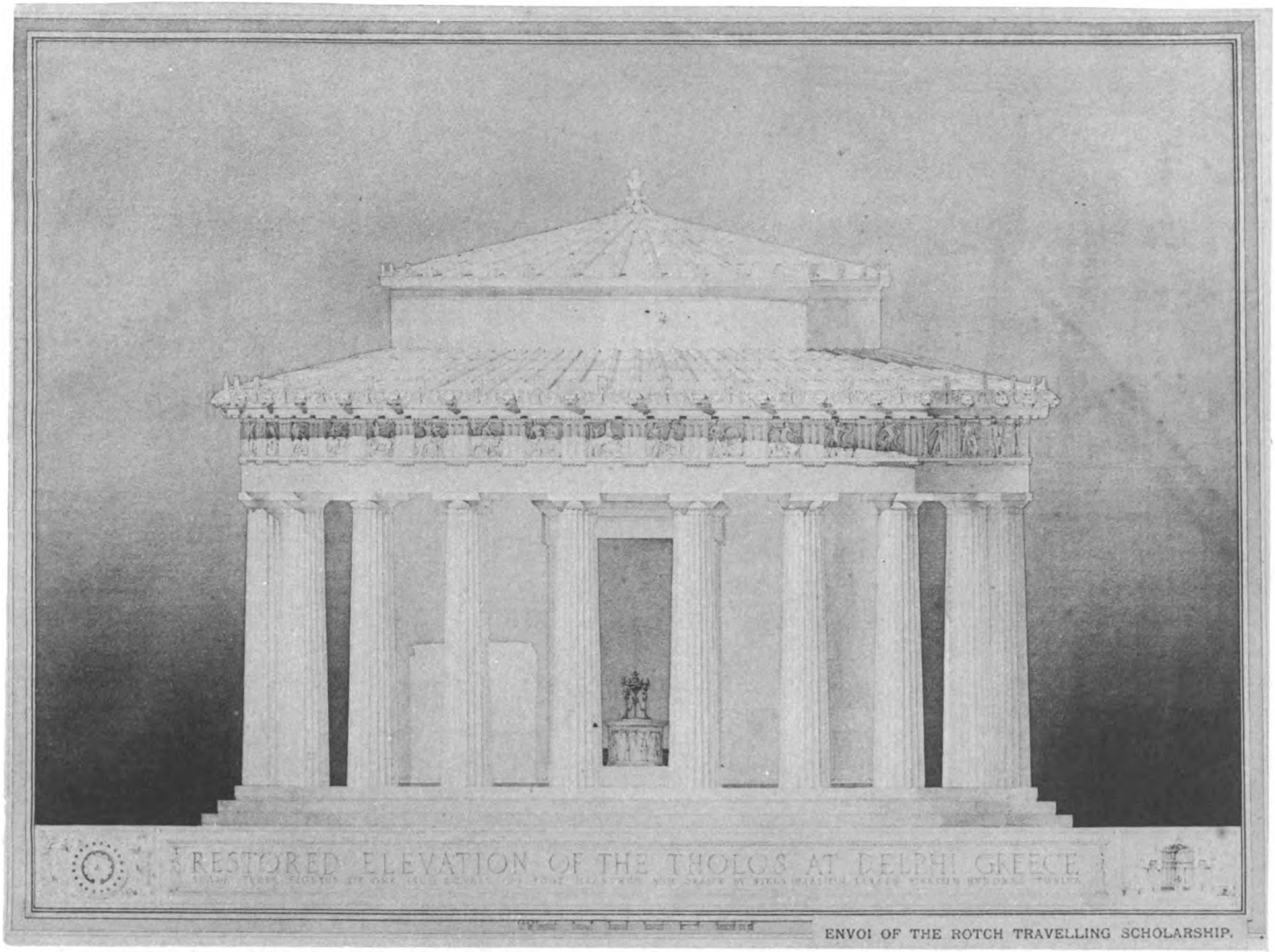
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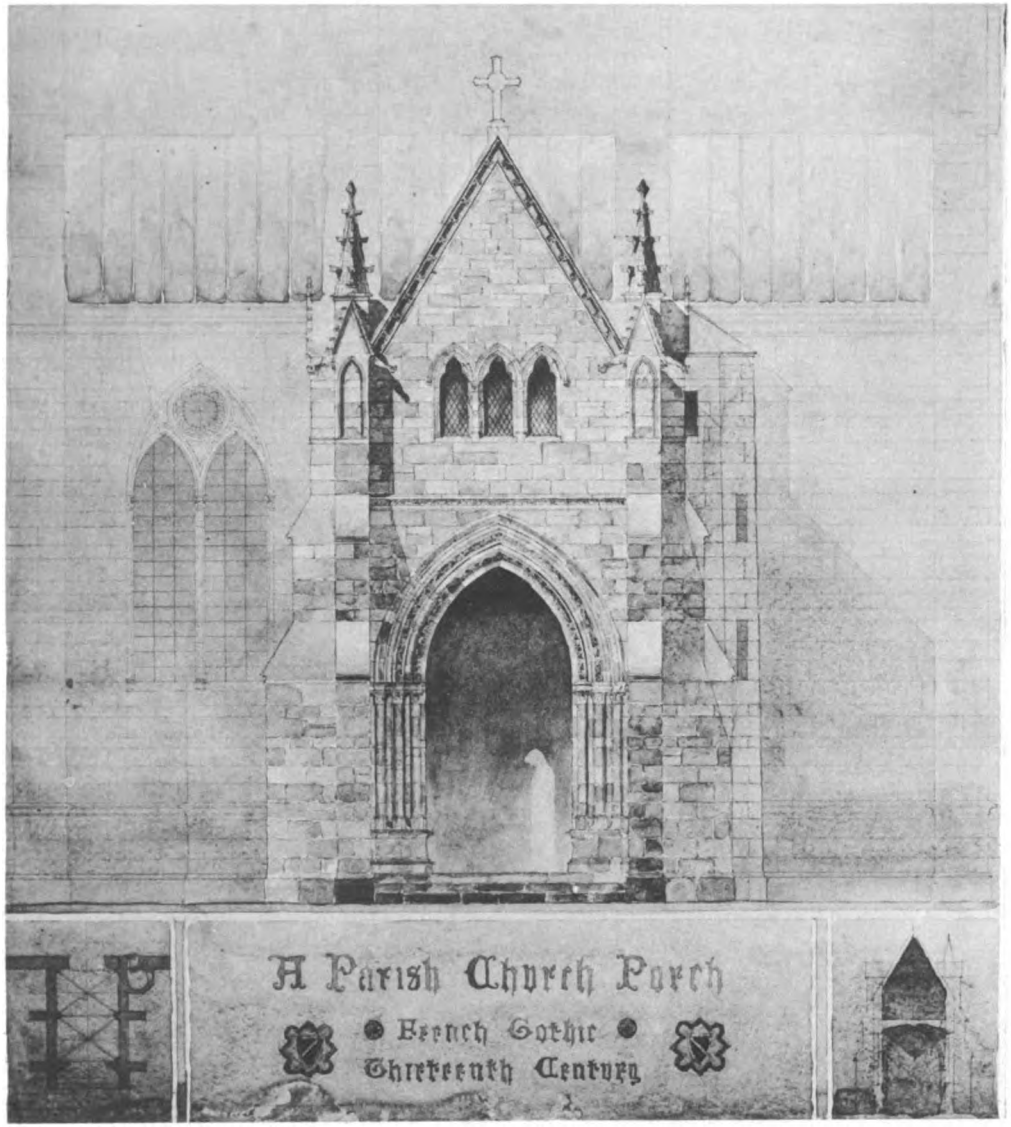
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RESTORATION OF THE THOLOS AT DELPHI

BY NIELS HALMAR LARSEN, SPECIAL STUDENT 1900-1902

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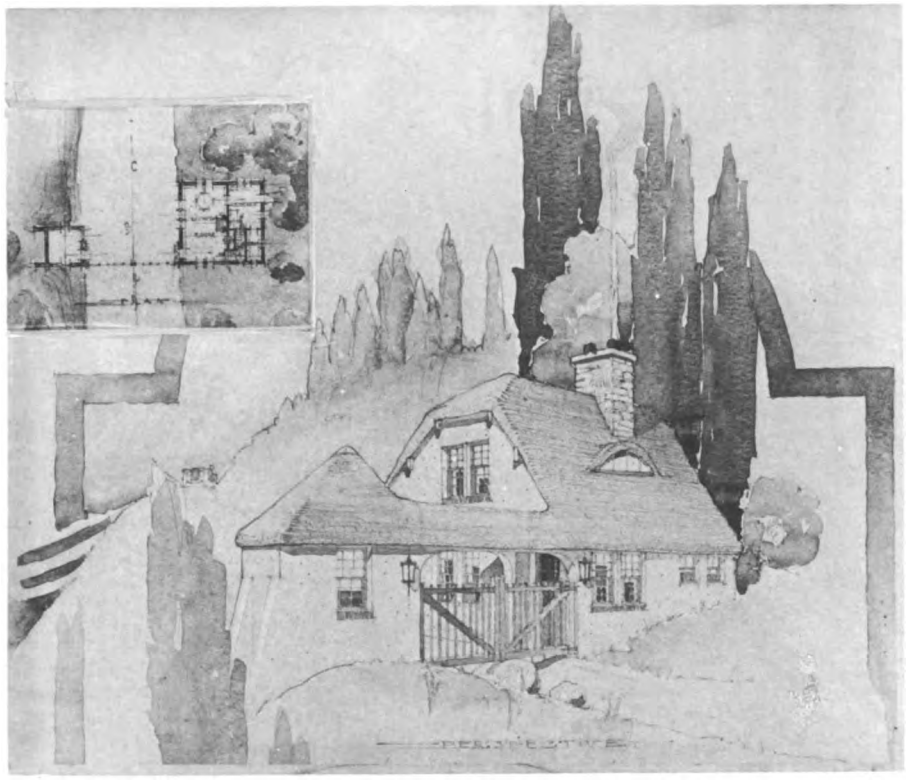
DESIGNS FOR THE PORCH OF A LARGE PARISH CHURCH

HISTORIC PROBLEM I. INTERMEDIATE DESIGN

H. A., B.F.A. H. C. BARTON

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A GATEKEEPER'S LODGE

TWELVE-HOUR SKETCH, INTERMEDIATE DESIGN

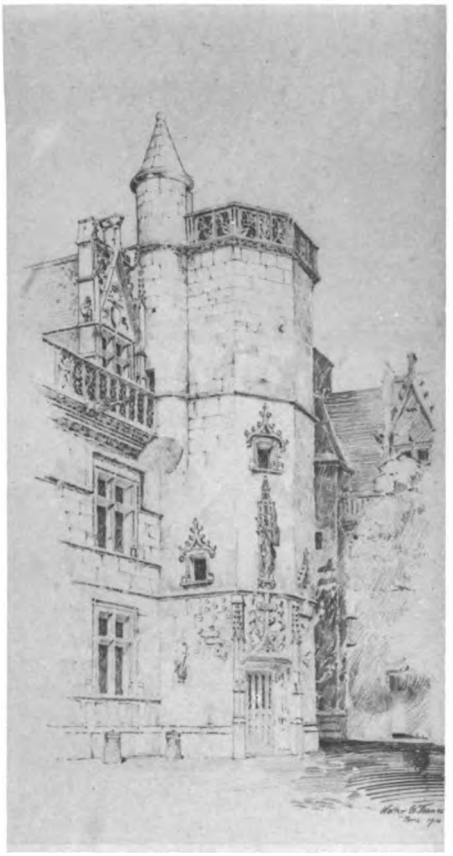
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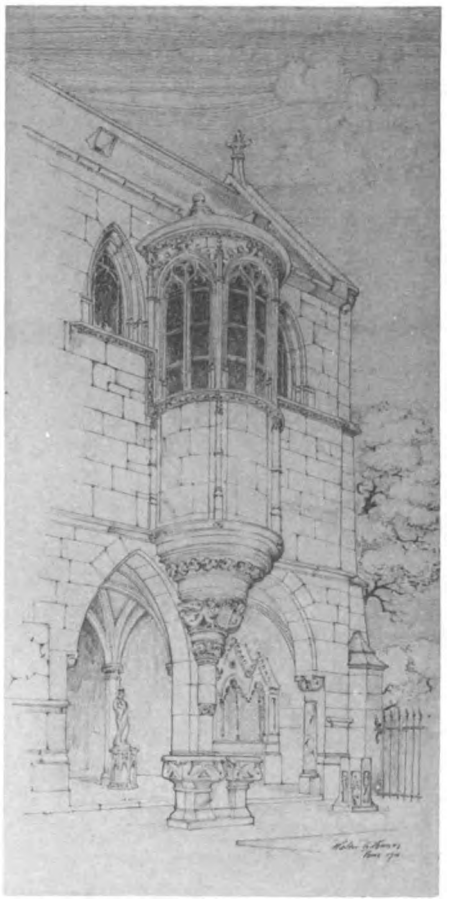
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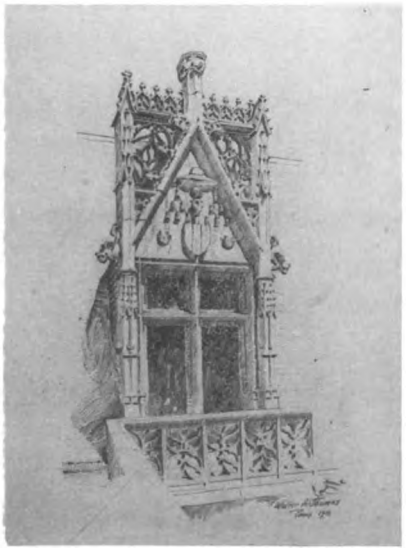
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BY

WALTER GRANT THOMAS S. B. IN ARCH. '07

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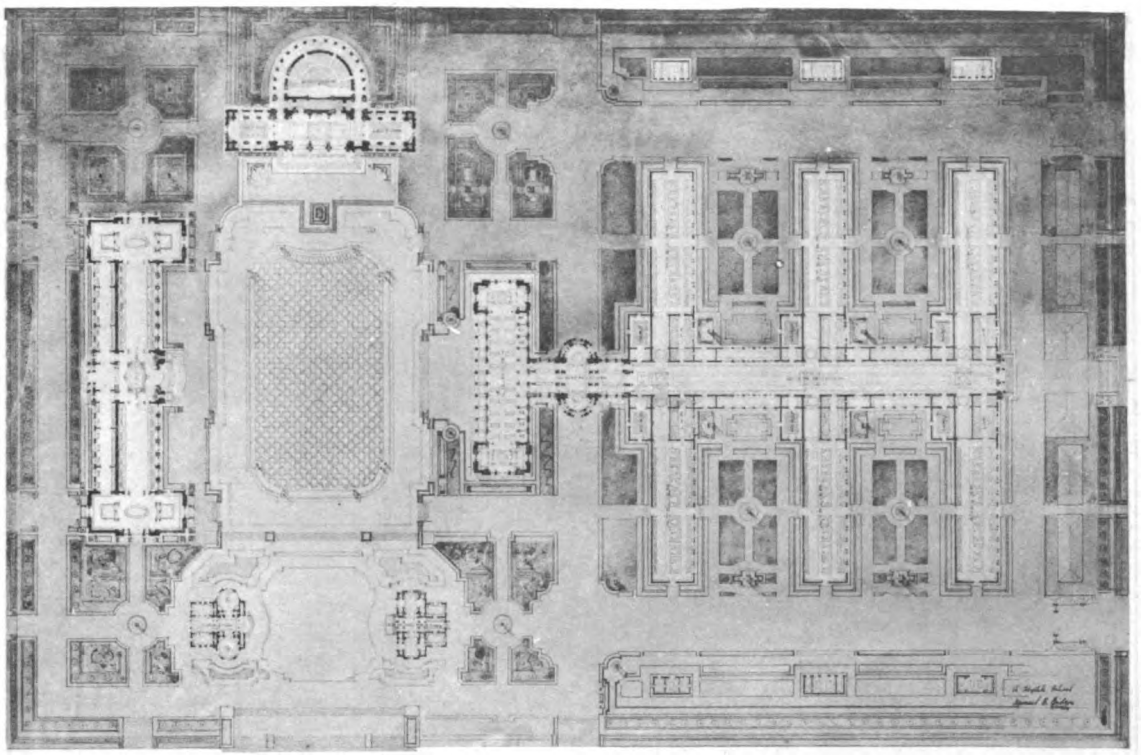
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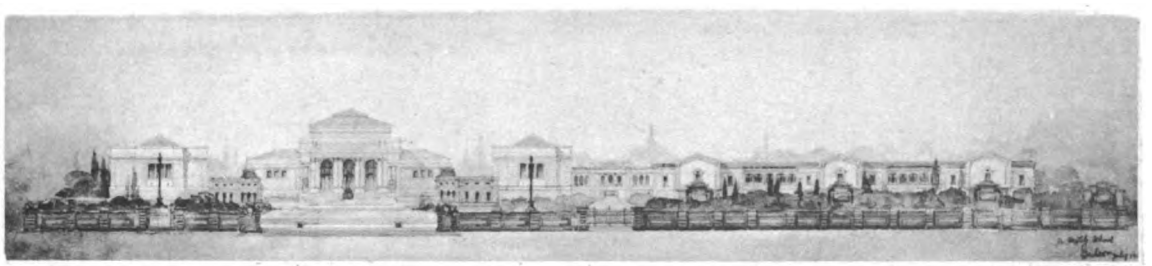
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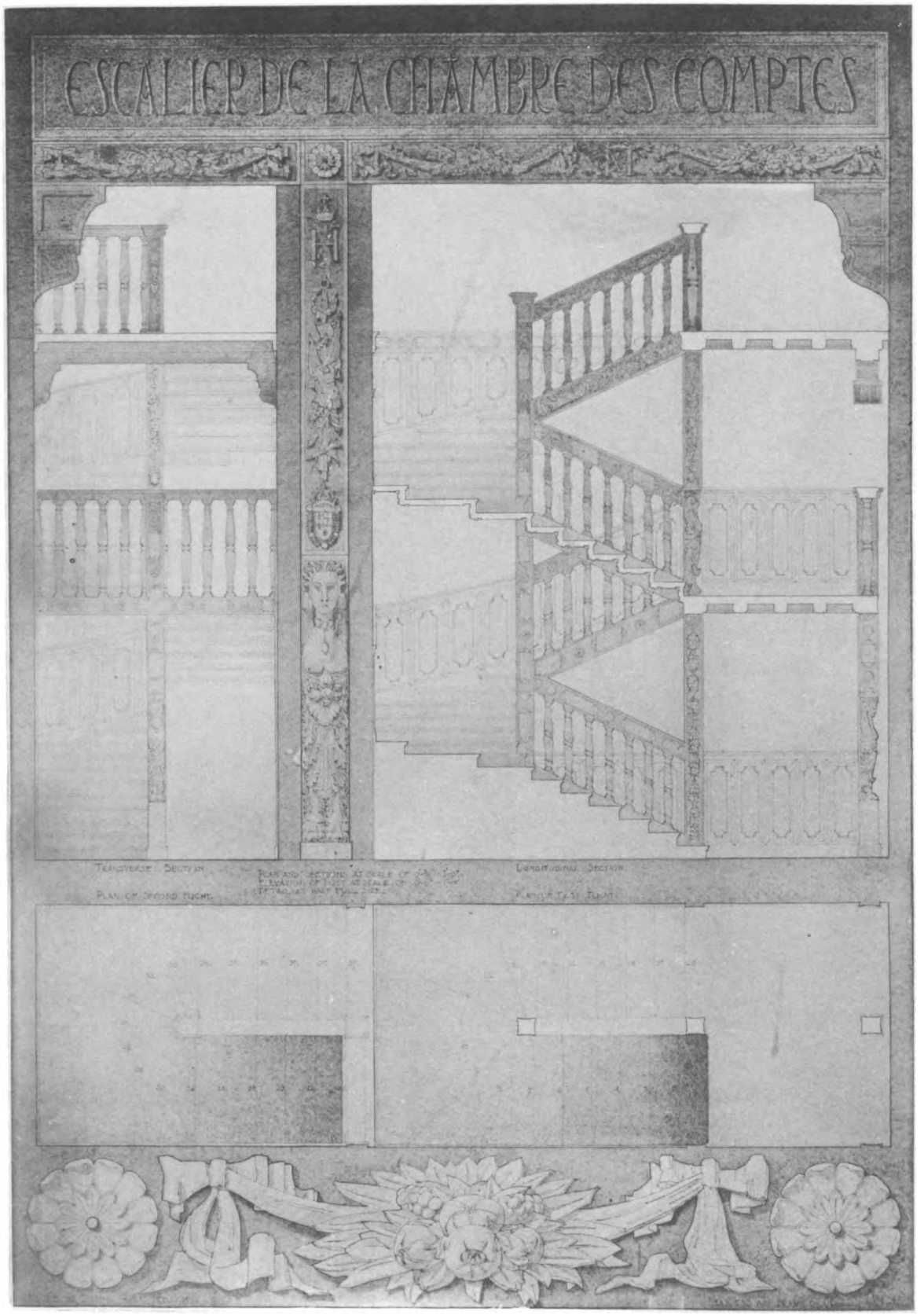
SAMUEL E. GIDEON

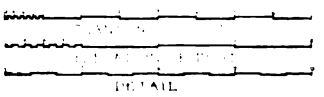
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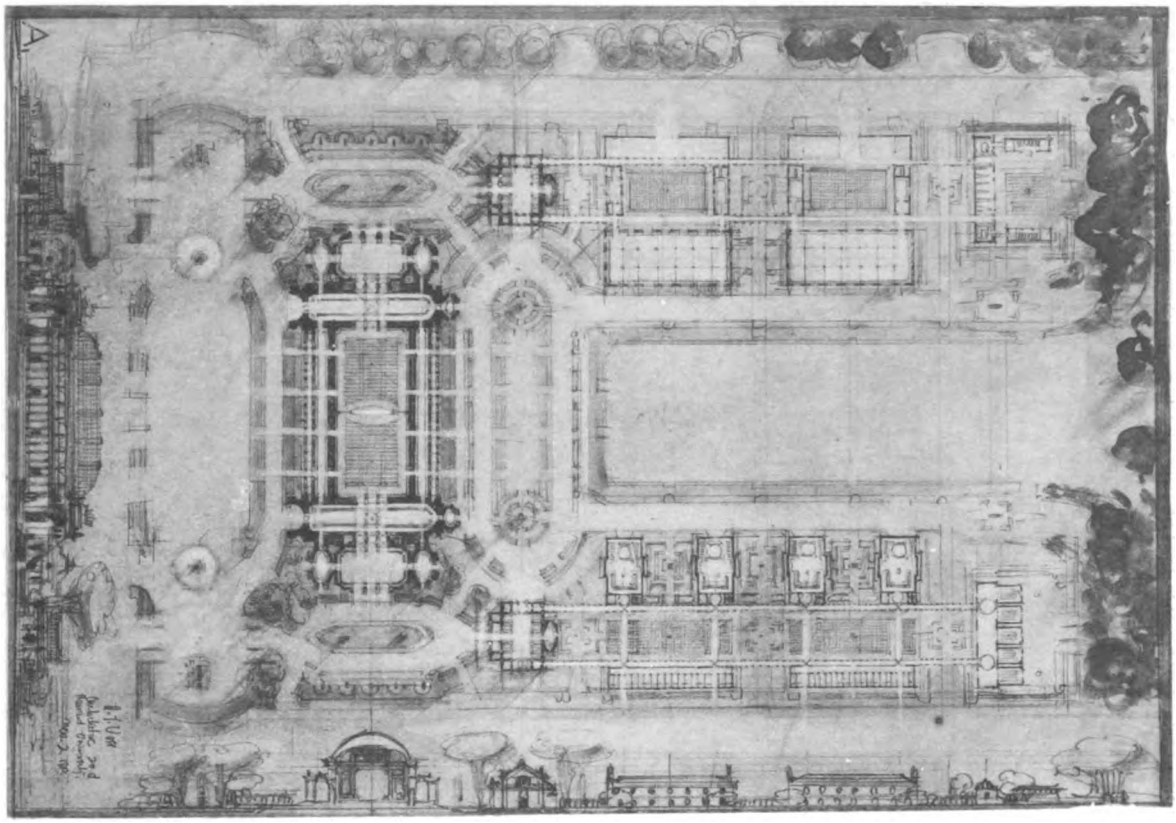


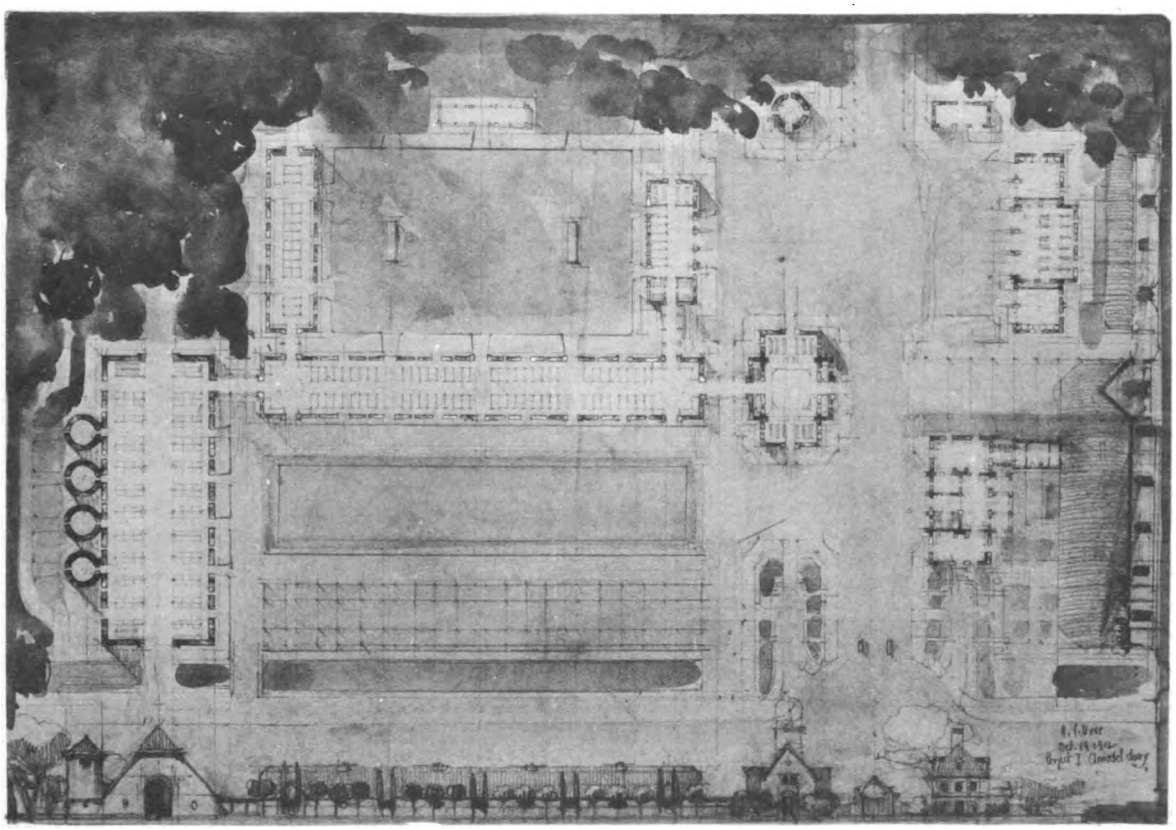
STAIRCASE OF THE CHAMBRE DES COMPTES
IN THE MUSEUM OF THE HOTEL CLUNY, PARIS
CHANNING WILLIAMS PORTER, A. B. '06, S. B. IN ARCH. '07
APPLETON FELLOW 1910-11

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A MOVING PICTURE ESTABLISHMENT BY H. T. VOSS

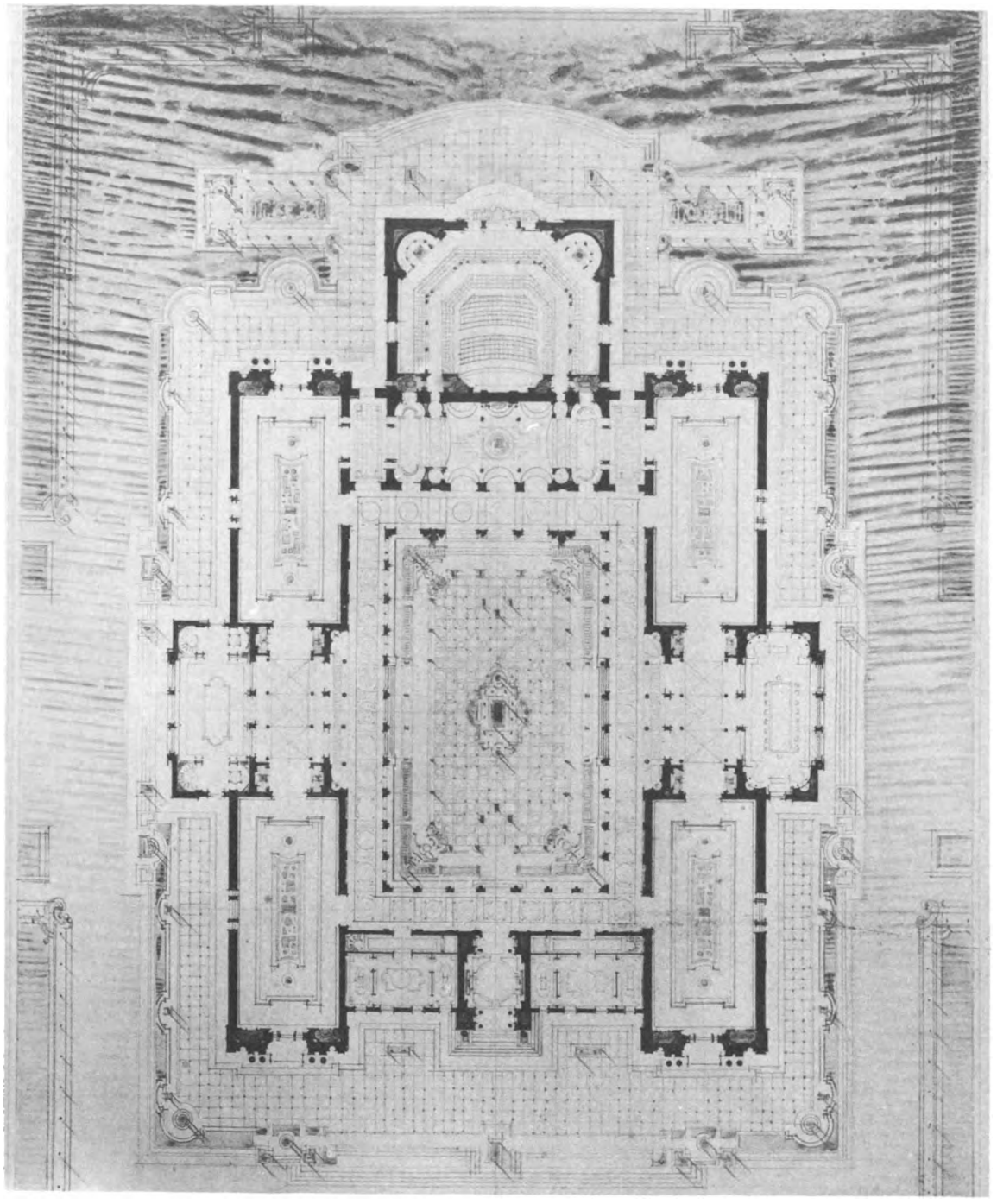
A MODEL DAIRY BY H. T. VOSS

SKETCH PROBLEMS, EVENING CLASS IN ADVANCED DESIGN

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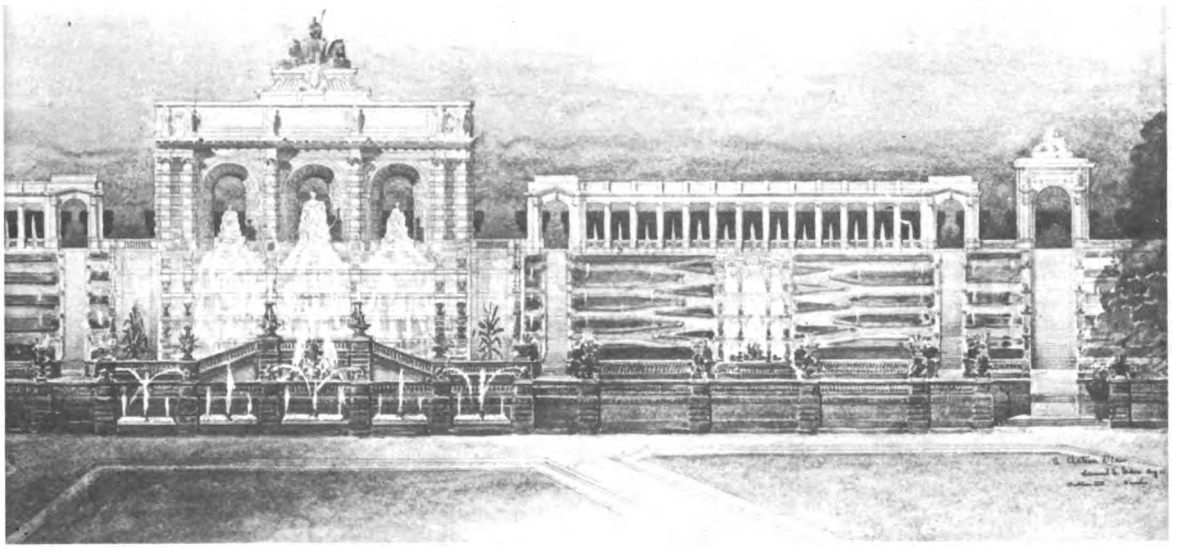
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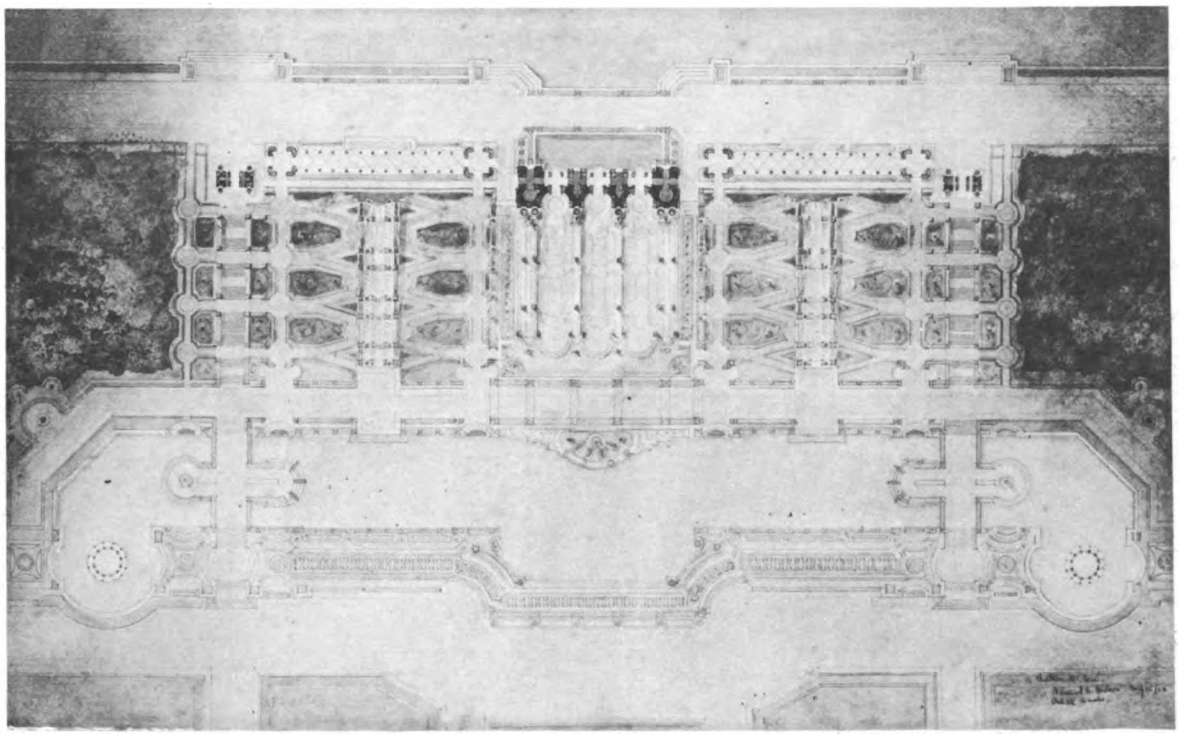
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H. DE V. FRATT, ELEMENTARY DESIGN

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WEST ELEVATION

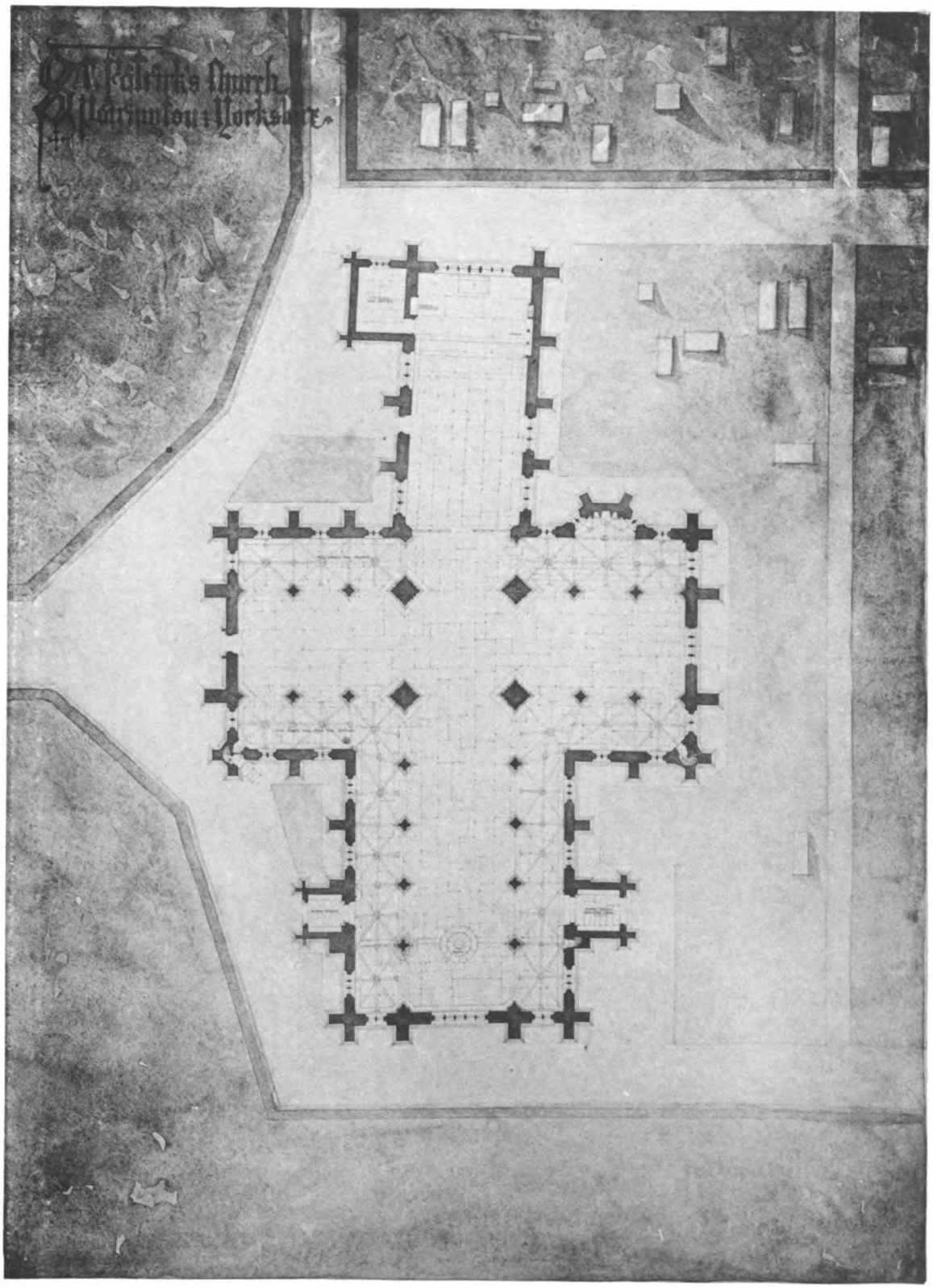
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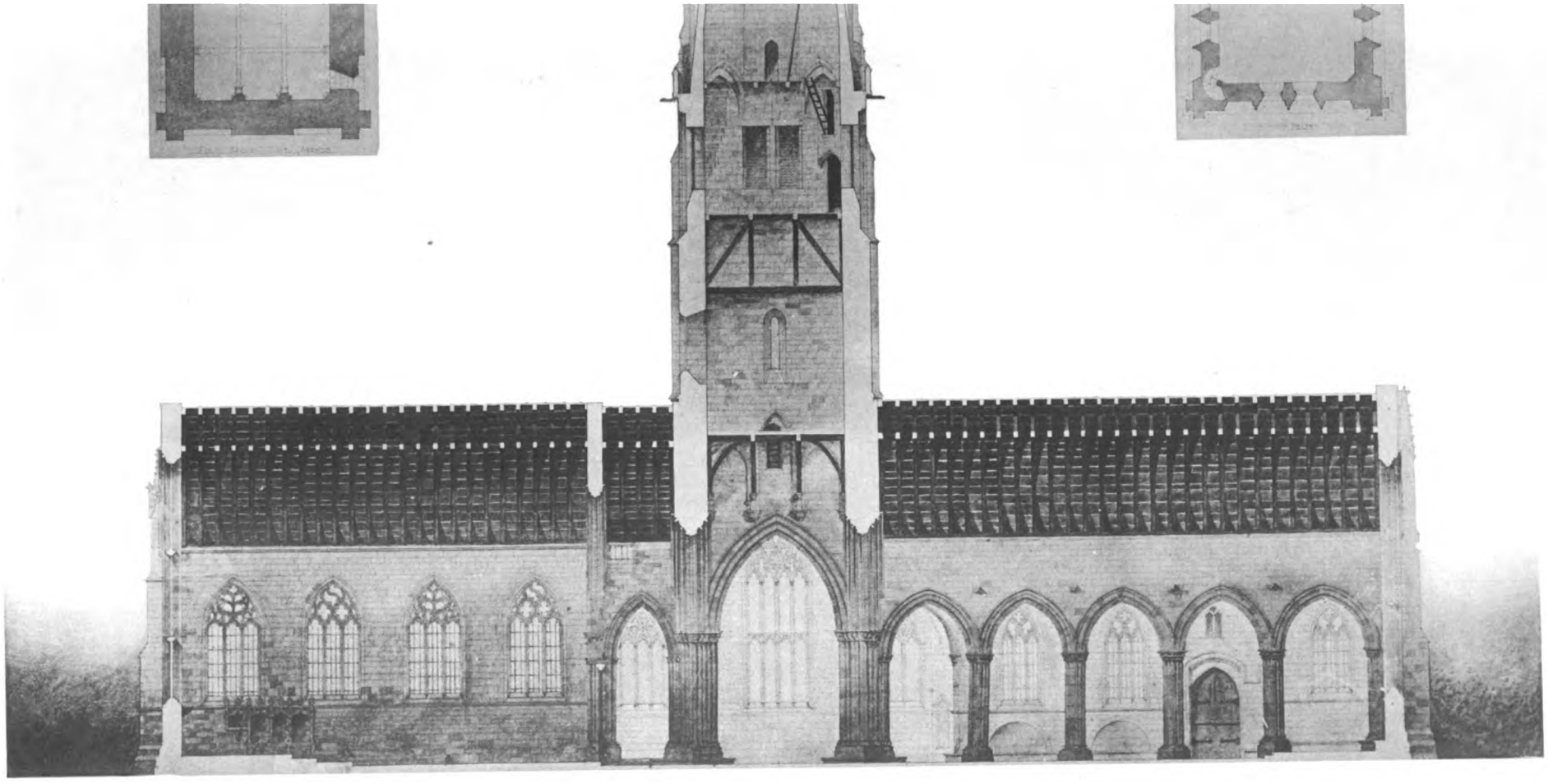
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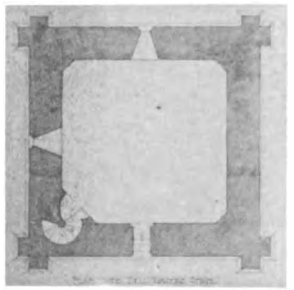
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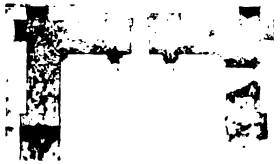
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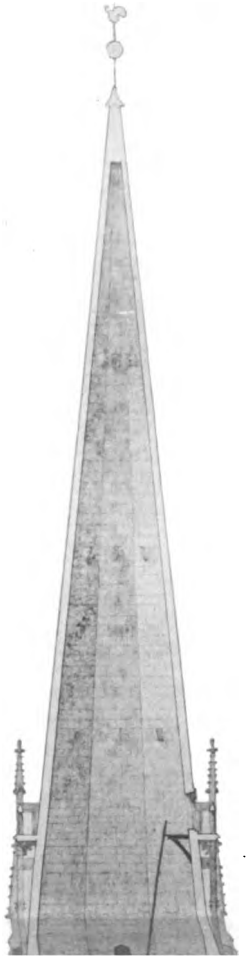
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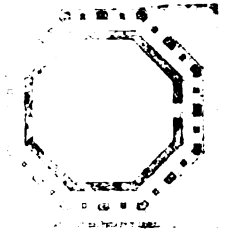
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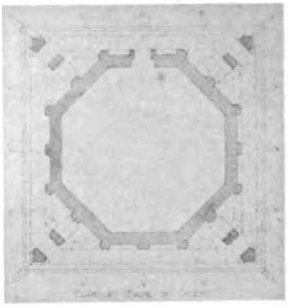


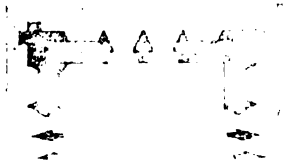






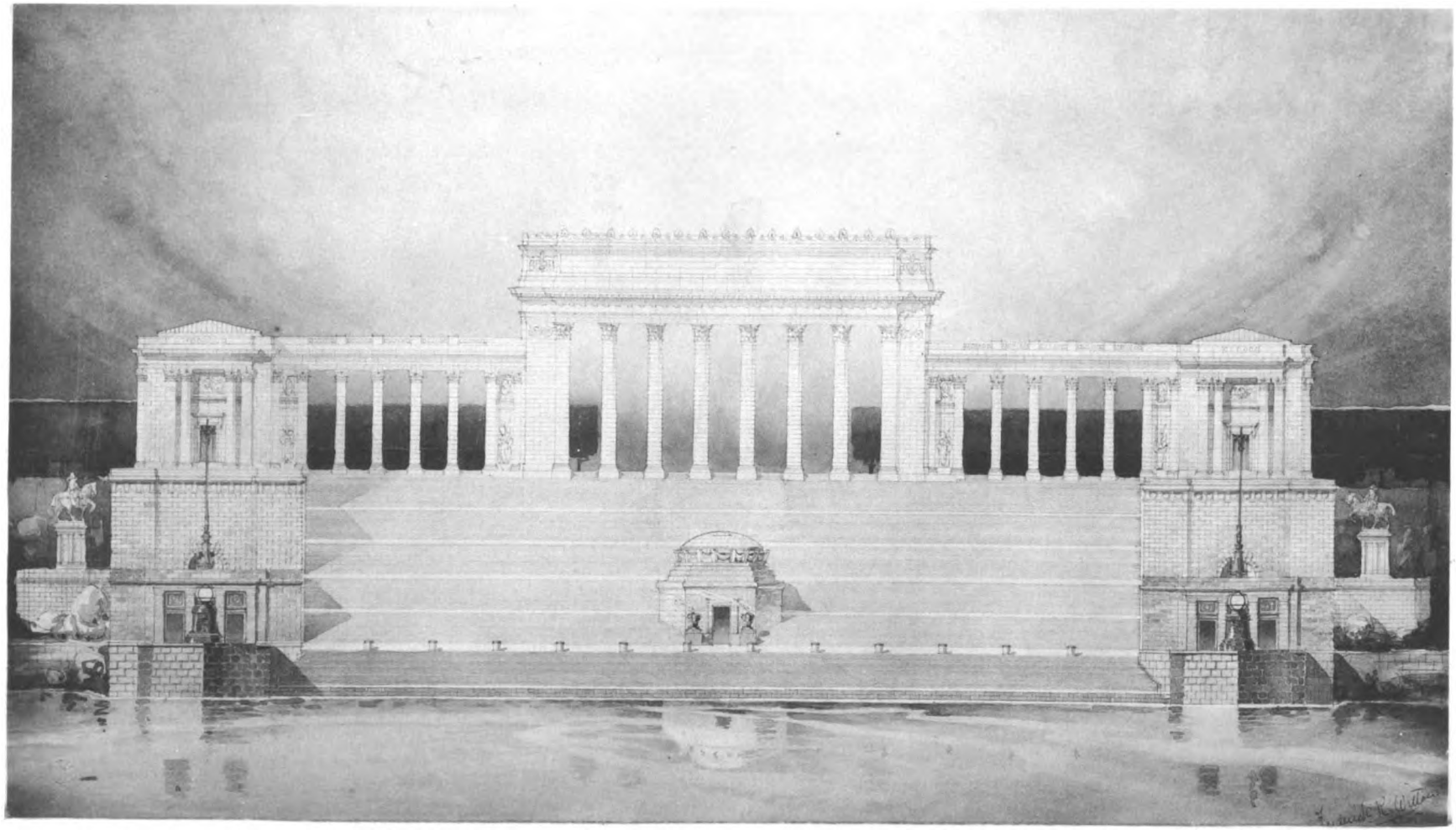






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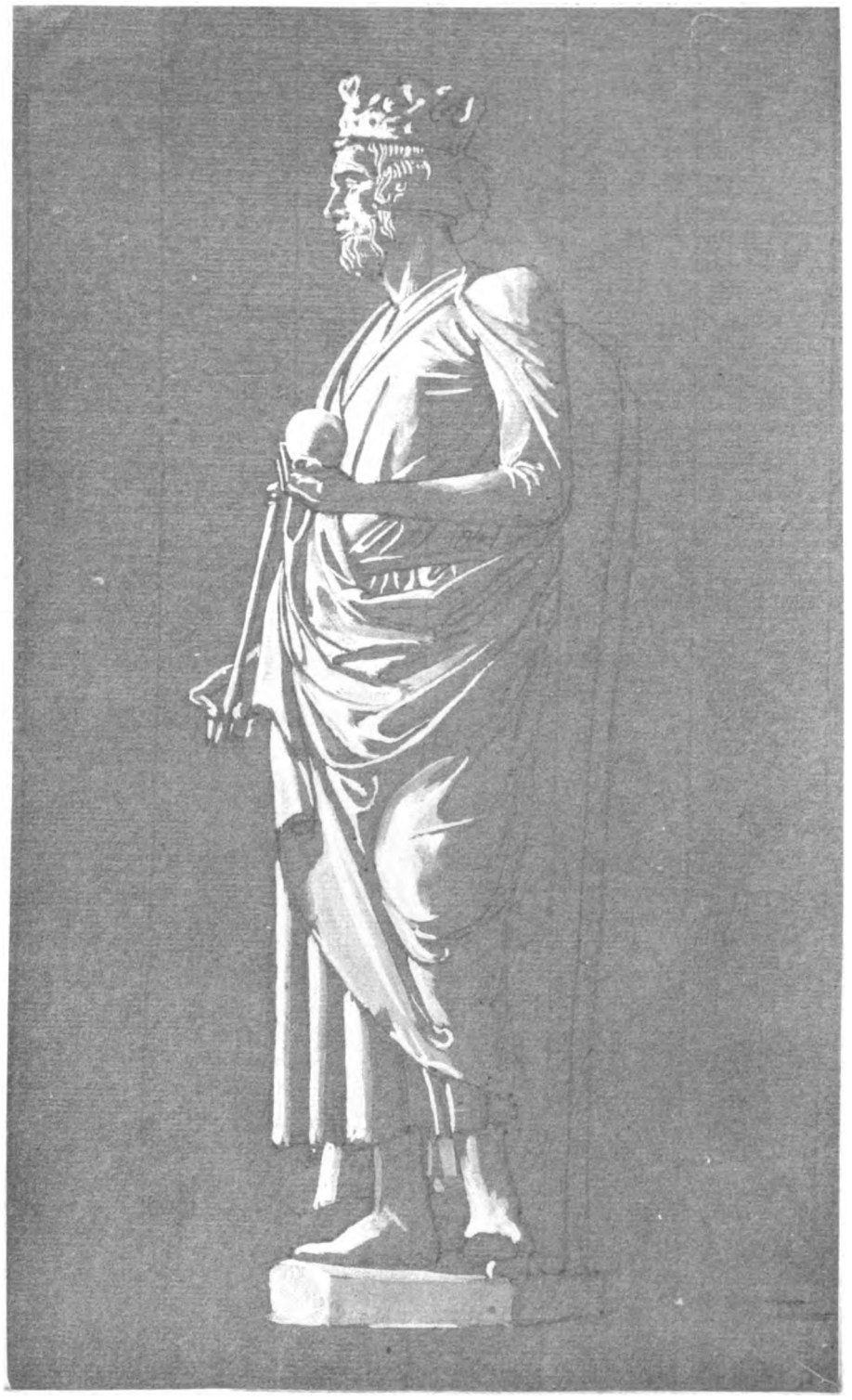
DESIGN FOR A WATERGATE

BY FREDERICK R. WITTON

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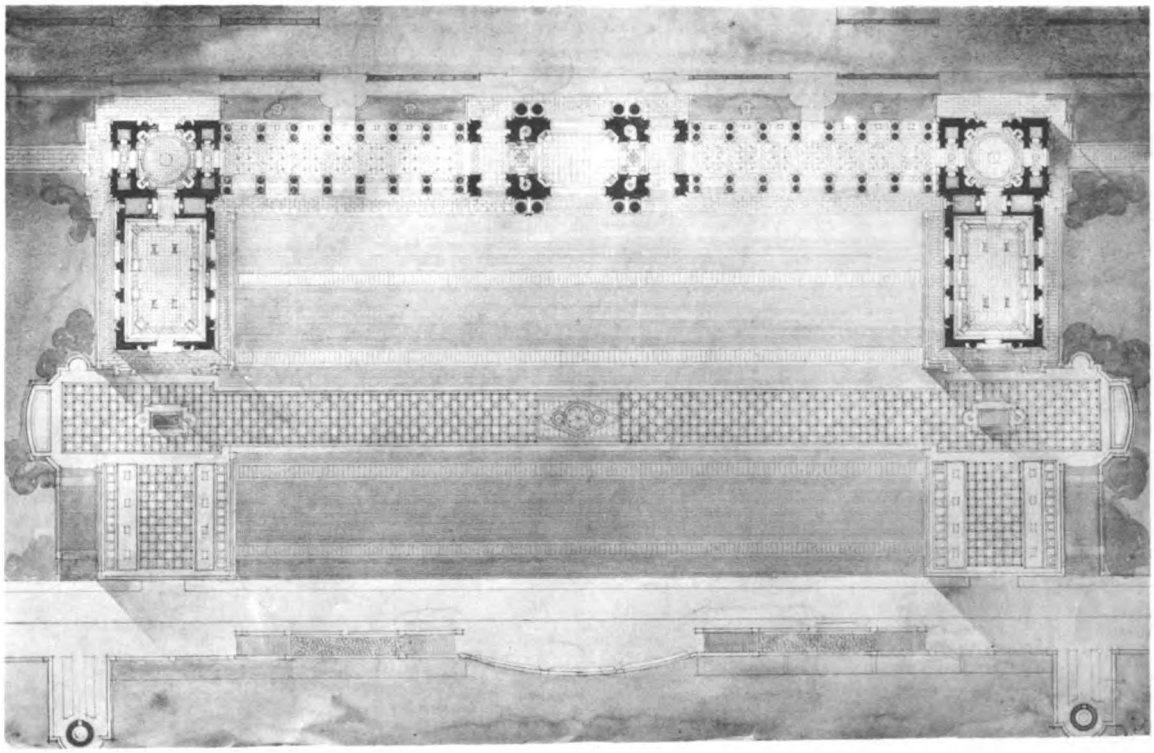


DRAWING FROM THE CAST

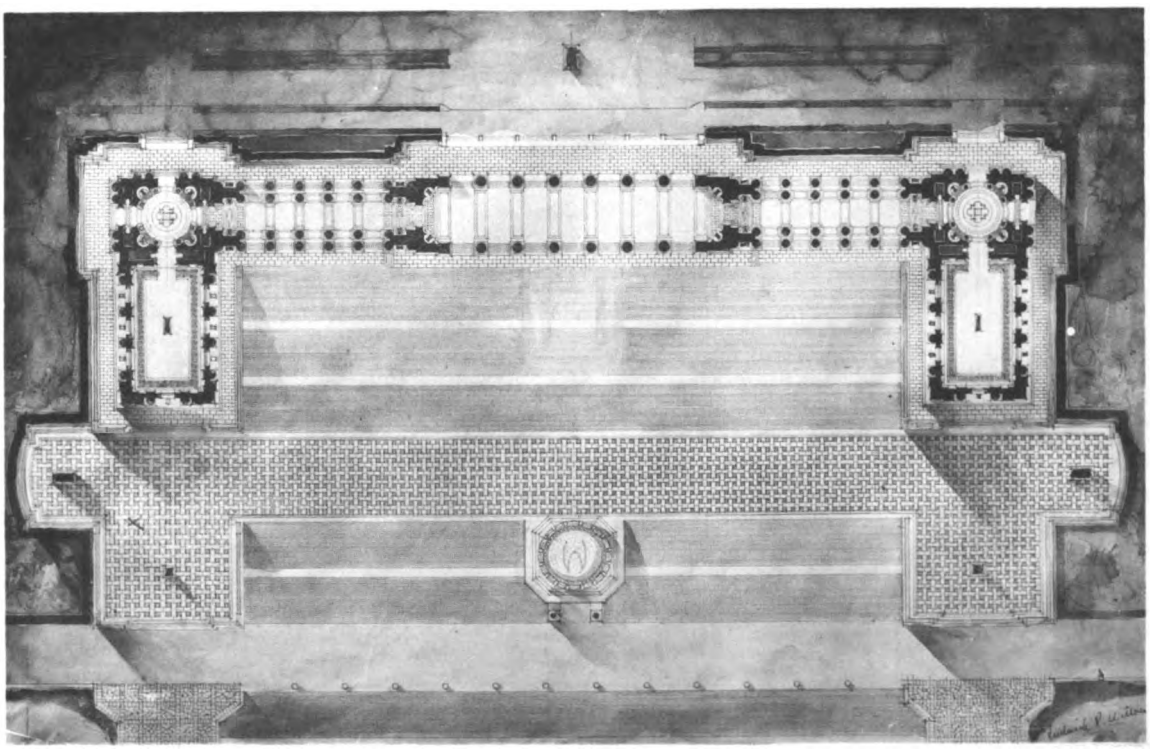
BY S. H. RATHBUN

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H. W. BEAL



FREDERICK R. WITTON

PLANS OF DESIGNS FOR A WATERGATE

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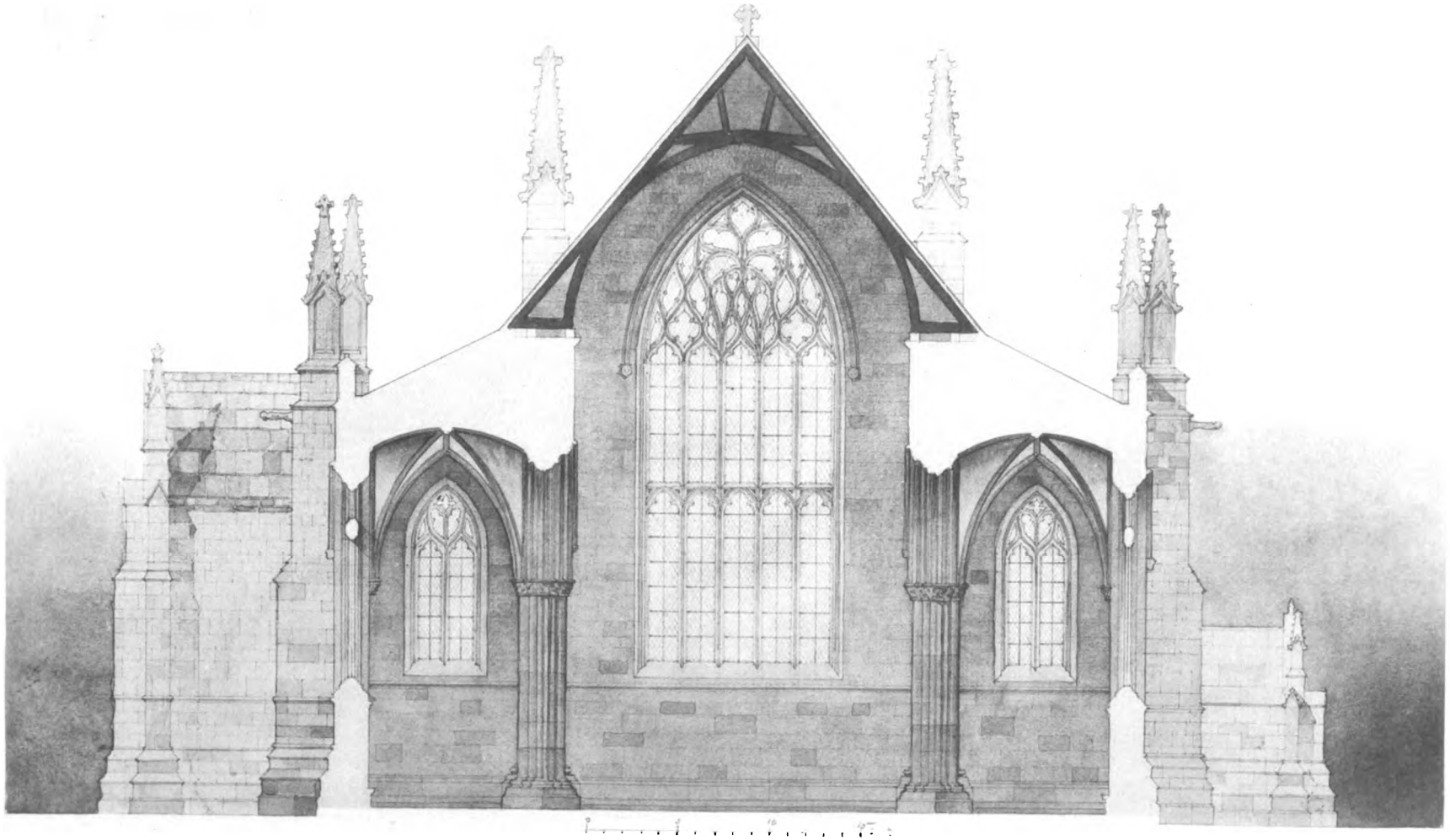
DESIGN FOR A WATERGATE

BY H. W. BEAL

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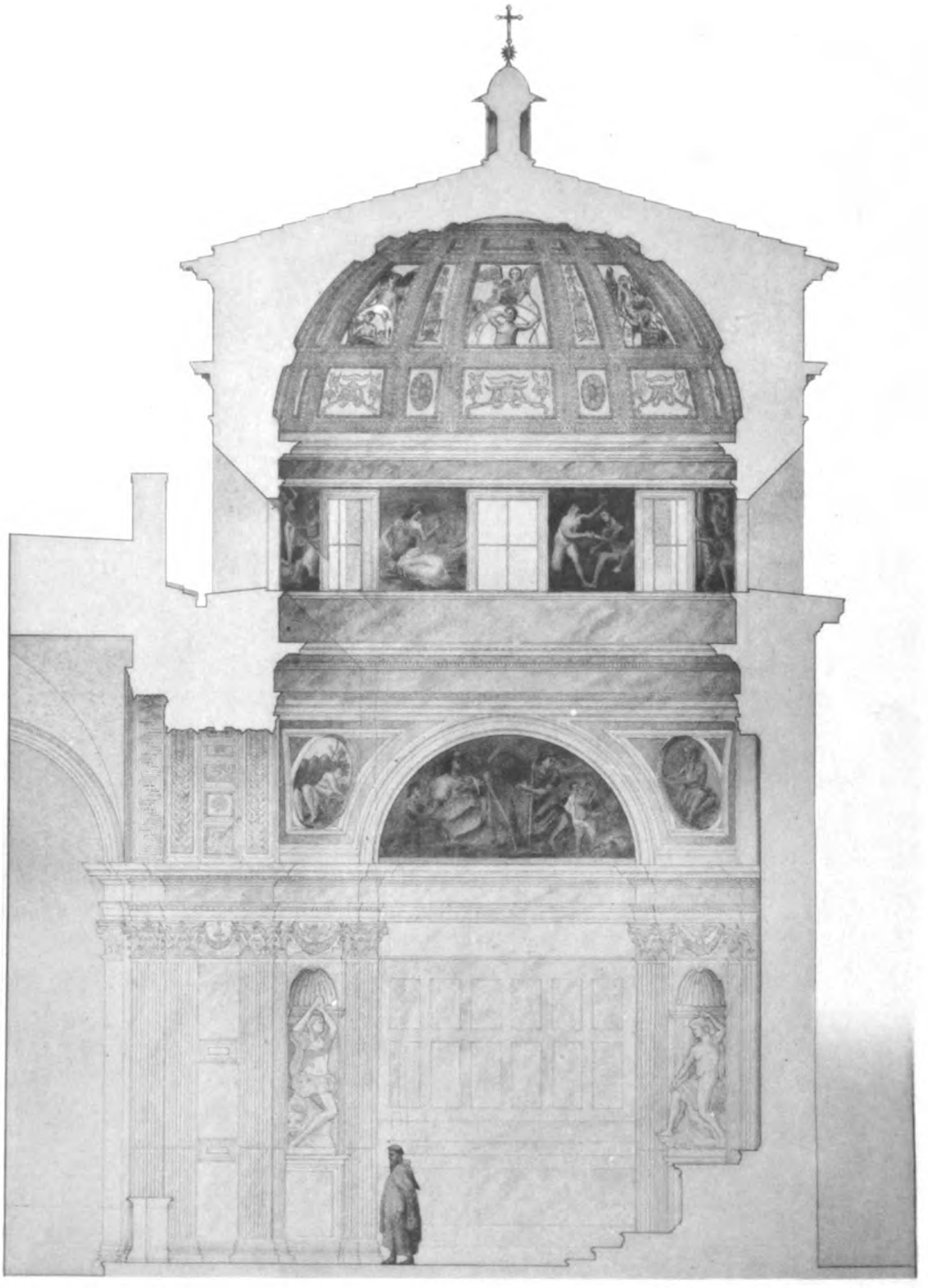


TRANSVERSE SECTION OF NAVE
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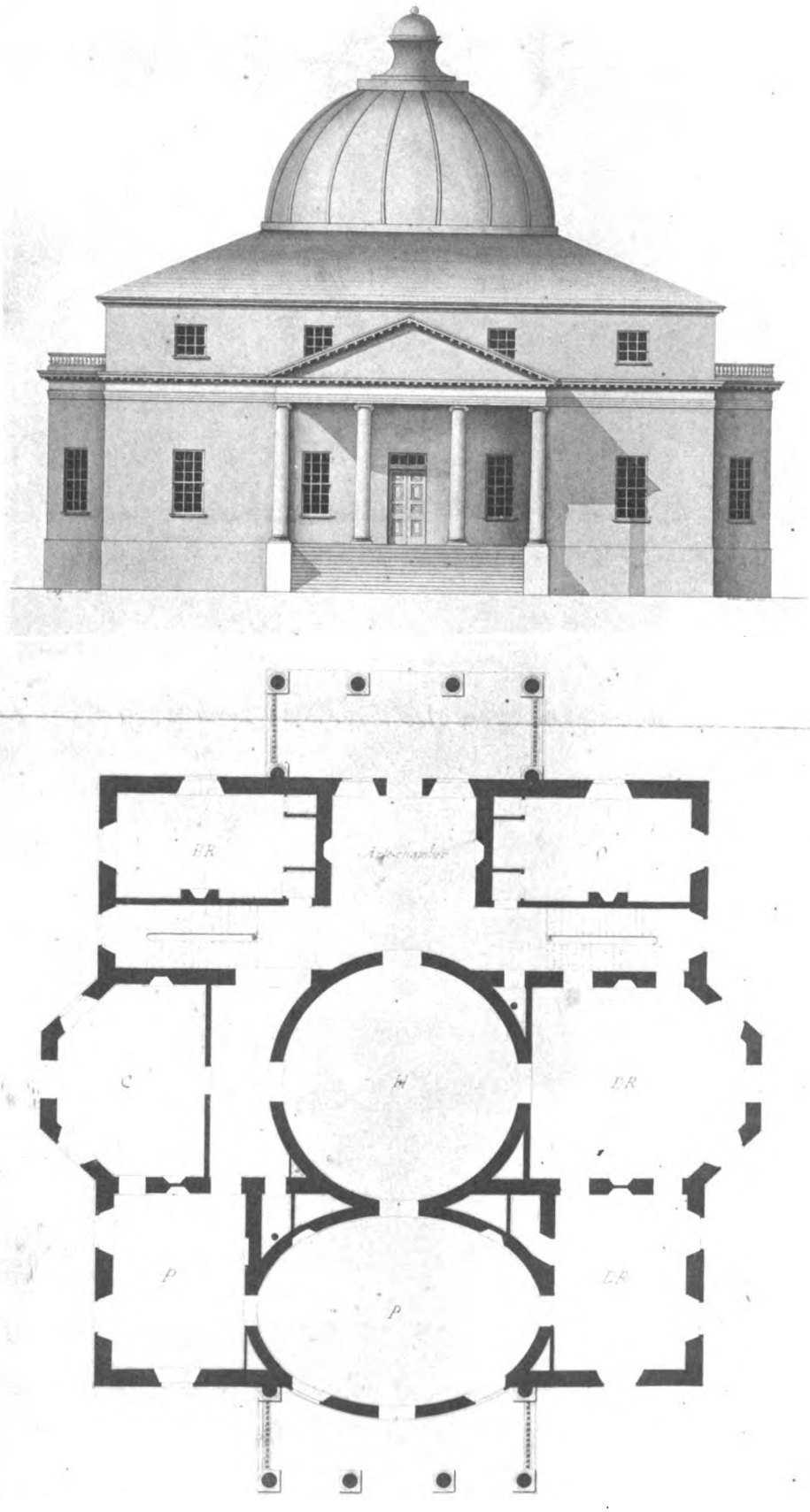


THE CAPELLA CHIGI IN THE CHURCH OF
SANTA MARIA DEL POPOLO, ROME
MEASURED AND DRAWN BY
CHARLES ROBERT WAIT S. M. IN ARCH. 1904
ROBINSON TRAVELLING FELLOW 1904 06.

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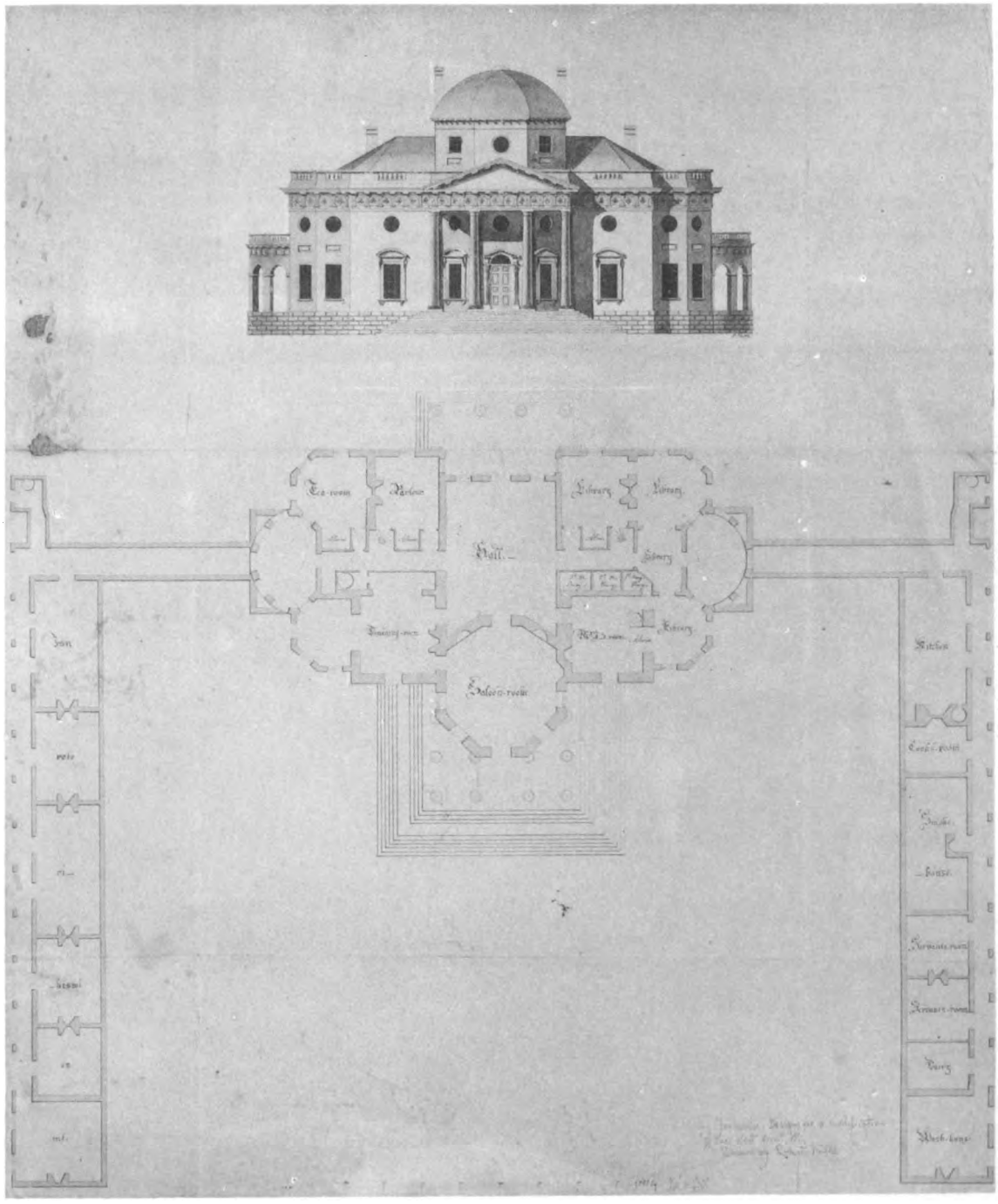
DRAWINGS FOR A REBUILDING OF SHADWELL
"T. JEFFERSON, ARCH'T. R. MILLS, DEL'T, 1803"

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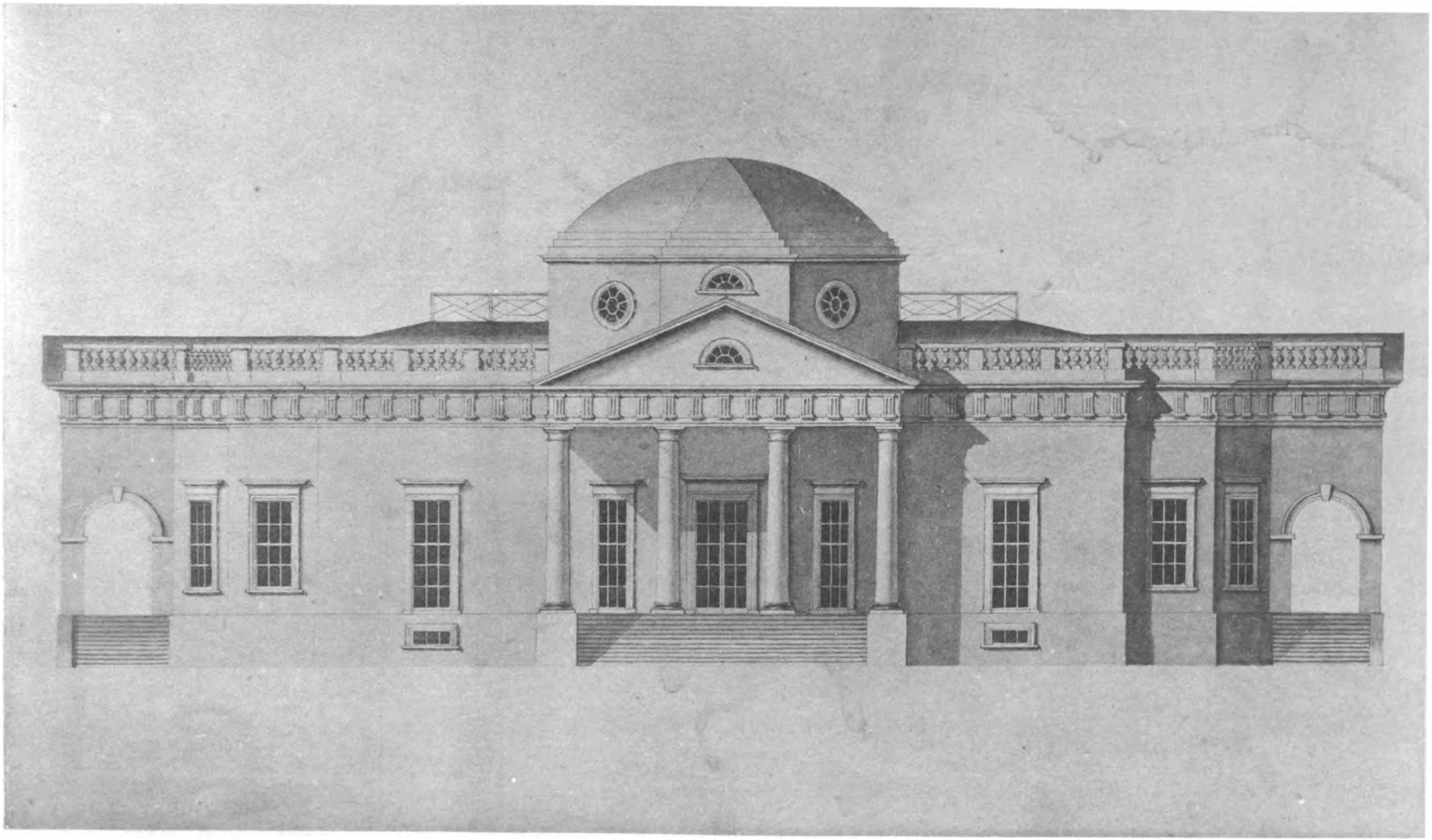


DESIGN FOR A FURTHER REMODELLING OF MONTICELLO, NEVER CARRIED OUT
SIGNED BY ROBERT MILLS

Supplement to the
Architectural Quarterly of Harvard University
June 1914

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WEST ELEVATION OF MONTICELLO, PROBALLY IN 1803
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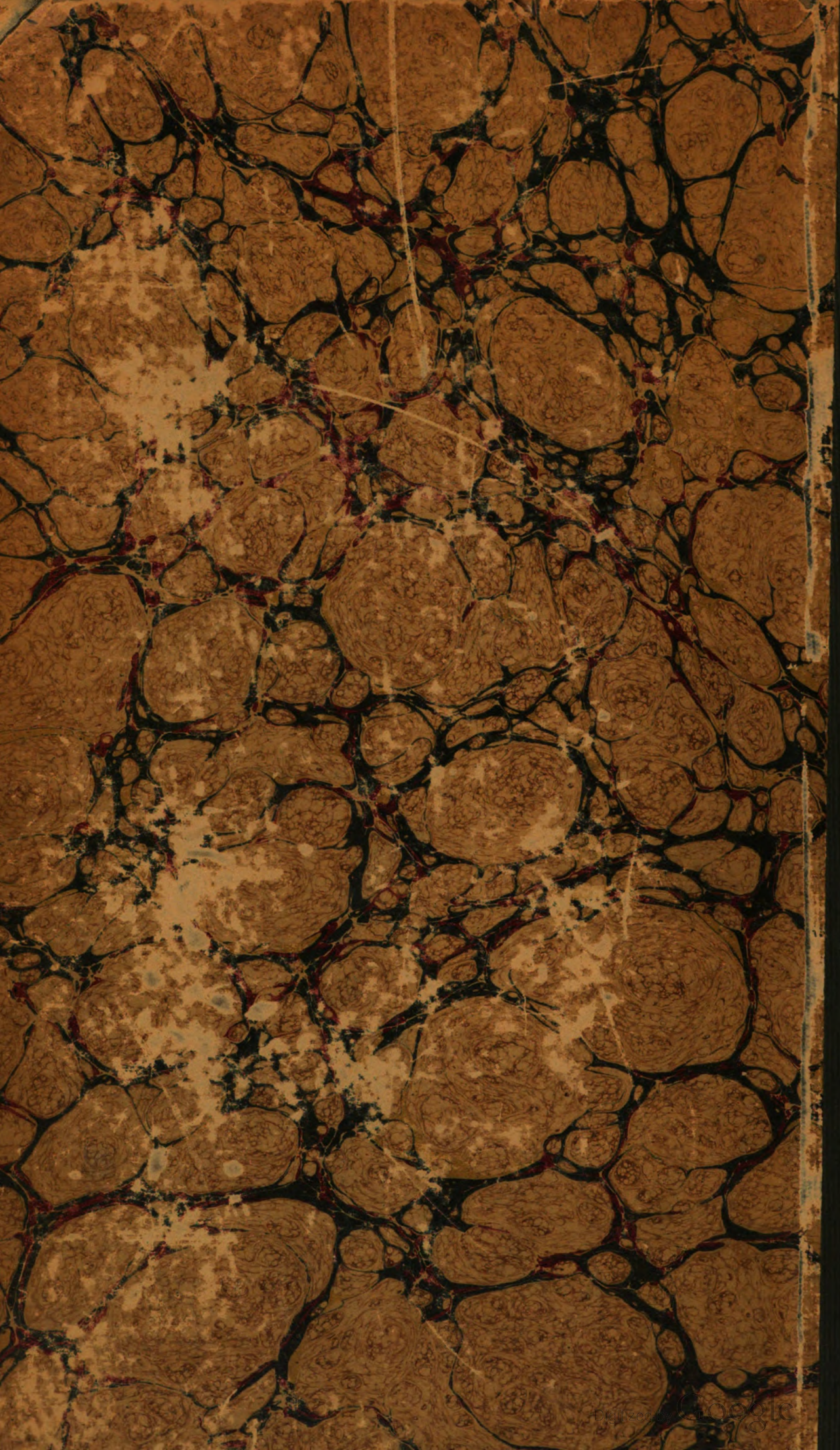
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